PSYCHOLOGICAL RESPONSES TO INFORMATION ABOUT HUMAN PAPILLOMAVIRUS AND CERVICAL CANCER: METHODS OF EVALUATING PRINT MATERIALS

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DECLARATION

I, Gareth Lloyd confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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ABSTRACT

Learning about human papillomavirus (HPV) has been identified as a possible source of negative affect in women, but the extent and nature of these emotions is unclear, along with whether they are associated with negative attitudes and behaviours (particularly with respect to HPV vaccination). The goal of this thesis is to examine the psychological impact of human papillomavirus (HPV) information using measures of knowledge, behavioural intentions, mood, attitudes and implicit associations. Existing literature was reviewed to examine a range of methods and outcomes suitable for use. Study 1 examined responses to health information in adolescent-aged women using a randomised between-participants design, and was carried out in a classroom setting. Participants given information about HPV and cervical cancer showed strong interest in future vaccination and did not display any more anxiety (as measured by the short form of State Trait Anxiety Index; STAI) than those participants given alternative control information. Three further studies adapted and refined this method for use with older women of university-going age in one-on-one testing sessions. These studies employed an enhanced range of outcomes, many of which were administered as repeated measures, and although showed positive evaluations of HPV material, strong behavioural effects were more difficult to elicit. Again few effects of anxiety were observed between information conditions. Implicit evaluations of the concept of 'cancer' were also examined using a computer-based Implicit Association Test, which showed some evidence of changes in associations following information exposure. Correlates of changes in implicit associations were also examined, with some relationships shown with behaviour and knowledge uptake but not anxiety or attitudes.

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1.1. Aims and purpose

The possibility of negative emotional responses to information about human papillomavirus (HPV) has been of significant concern during the introduction and subsequent maintenance of HPV testing and vaccination programmes. This thesis aims to assess experimentally the impact of HPV information on knowledge, attitudes, affect and behavioural intentions.[1] This chapter will first review the medical literature on HPV's role in the development of cervical cancer and HPV testing and vaccination, and subsequently the ethical and psychosocial implications of these developments including issues of informed consent and the challenges involved in providing HPV information to the public.

1.2. HPV and cervical cancer.

High-risk types of papillomaviruses in humans are now established as necessary, though not sufficient, causal factors in the development of the majority of cervical cancers, as is claimed in a synopsis of available literature by Bosch and Sanjose (Bosch & de Sanjose, 2002), and as supported by clinical trials(an early example of which was Walboomers et al., 1999, where invasive cervical cancers were examined for indications of past infection with HPV). Munoz et al. (2002) examined data from 11 case-control studies which tested for the presence of HPV DNA in a pooled sample of 1918 women with cervical cancer and 1928 control women. HPV DNA was found in 96.6% of those patients with cervical cancer compared with 13.4% of controls. 20 strains of HPV were identified as precursors of cervical cancer, with varying degrees of risk: 15 high-risk types were identified, along with 3 probable high-risk types and 12 low-risk types. However, HPV16 and HPV18 can be identified as those strains which

[1] This work was largely carried out between 2006 and 2008, before the vaccine programme was implemented and when there were concerns over public knowledge about HPV.

[2]A version of this study waspublished in the November 2009 issue of the Journal of Adolescent

are most commonly associated with the majority of invasive squamous cell carcinomas detected worldwide; this is around 70% of cases according to Walboomers et al.(1999). HPV16 accounts for 50-60% of these carcinomas, and HPV18 accounts for a further 10-15% (Clifford et al., 2003). Furthermore, a large proportion of adenocarcinomas (the second most common histology) can be also attributed to these strains: around 40% to HPV16 and around 30% to HPV18 (Castellsague et al., 2006; Birch et al., 2002). These studies again examined cases of invasive cervical cancers for indications of past infection with specific strains of HPV DNA.

HPV is sexually transmitted, and infection with one of the high-risk types is a common occurrence; recent results found a point prevalence of HPV infection of 27% in women aged 14-59 in the USA (Dunne et al., 2007b), although other estimates have ranged up to 46% (Ho et al., 1998; Bauer et al., 1991a; Richardson et al., 2003). The ARTISTIC trial in the UK (Kitchener et al., 2009) showed variations by age: women aged 25-29 showed a point prevalence of 27.9%, compared with 6.5% in those aged 50-64. These studies recruited women in various settings in order to determine point prevalence; Dunne et al. (2007a) for example tested a representative sample of US women at home aged 14-59 years of age, while Bauer at al. (1991b) tested women of university-going age. A similar sampling method was used by Ho et al. (1998) but tested for presence of HPV at six-month intervals over three years, with a cumulative 36-month incidence of 43% for those women in the testing population who were HPV-negative at baseline. More than 80% of sexually active women are estimated to become infected with the virus at some point in their lives (Monsonego, 2004). For many women, initial infection with HPV occurs during adolescence: Brown et al. (2005) employed a methodology similar to that of Ho et al., and found that 82% of sexually active female adolescents acquired the virus over a two-year study period.

Infections with HPV are, in general, not associated with any short-term symptoms and in most cases resolve spontaneously through the action of the immune system (Moscicki, 1998). A recent report by the US Center for Disease Control reported that the median duration of new infections is around eight months, with even the more resistant HPV16 strain unlikely to persist for more than two years (Gerberding, 2004). Infection with a high-risk type of HPV does not inevitably lead to the development of cervical cancer, but persistent infection may lead to development of cervical

intraepithelial neoplasia (CIN; the growth of abnormal cells in the lining of the cervix, graded at three levels of development and associated risk) or cervical cancer. Those infections which do not lead to CIN or cervical cancer will generally be cleared by immune response; a study of clearance rates of 14 high-risk HPV types in 44,000 women by Bulkmans et al. (2007) showed a mean clearance rate of 65% at 18 months, although for HPV16 this was 49%.

1.2.1. Epidemiological implications of HPV developments

The discovery of the role of HPV in the development of cervical cancer has implications both in terms of cancer screening and prevention. Conventional screening for cervical cancer uses exfoliative cytology to test for abnormal cells in the cervix. The UK's programme has proven effective in reducing mortality and incidence of squamous cell carcinoma; in a mortality trend analysis by Peto et al. (2004), the authors suggest that rising mortality rates (a three-fold increase in women under 35 between 1967 to 1987) were reversed by the introduction of the programme in 1988. Cervical cancer remains a significant health threat however, with statistics provided by Cancer Research UK (2010) showing nearly 3000 new cases of cervical cancer diagnosed in the UK yearly, representing a lifetime risk of 1 in 136 for a female to develop cervical cancer. It also remains possible for women with normal screening histories to go on to develop cervical cancer. In a sample of 348 UK women who had developed late stage carcinoma, around half had previously received a clear cytology result (Sasieni et al., 1996). Following the discovery of the presence of HPV DNA in the vast majority of cervical cancers, testing for this DNA as a means of triaging borderline results has been recommended for use alongside conventional cervical screening in the US. Following evaluation for inclusion in the National Screening Programme in the UK (Cuzick et al., 2000; Cuzick et al., 2006) HPV DNA testing is currently being rolled out across the UK. Tests have been developed which are easily performed with samples obtained using liquid-based cytology (LBC), and may offer the potential for improved detection and sensitivity rates along with longer intervals between screening dates. The HPV in Addition to Routine Testing (HART) study (Cuzick et al., 2003), involving 11085 women aged 30-60 years, compared detection rates using HPV testing and conventional cytology, and showed greater sensitivity by HPV testing in detecting high-grade CIN

than conventional screening, although alongside lower specificity. The inclusion of HPV testing in primary screening is therefore recommended by the authors; possibly to be used alongside conventional cytology as a means of triaging HPV-positive women.

A second implication is that barrier protection by condom use could play a role in prevention of cervical cancer through prevention of HPV infection. However, a meta-analysis of 27 estimates from across 20 studies (Manhart & Koutsky, 2002) concluded that although condom use reduces the risk of genital warts along with grade 2 or 3 CIN and cervical cancer, consistent evidence that condom use protects against becoming HPV positive could not be shown. Although the relationship between condom use and CIN/cervical cancer may imply a relationship with HPV infection, the authors suggest that this may be a complex one involving consistency of behaviour in different types of relationships. Despite a number of problematic inconsistencies, the authors conclude that if condoms do afford protection against HPV this is almost certainly incomplete. Winer et al. (2006) conducted a in a more recent study in which 82 female university students with no current gynaecological problems reported on sexual activity and condom use with male partners over an eight month study period, testing for presence of HPV infection at the outset and end of this period at the minimum. This study differs from those covered in the review by Manhart and Koutsky (2002) because it showed an inverse relationship between condom use and HPV infection, with the authors suggesting that the longitudinal design and frequent measures of behaviour may have exposed this result. Therefore, while it is difficult to advise condom use as a guaranteed preventive behaviour against HPV infection, it may be an appropriate recommendation for reducing individual risk.

Another development has been the demonstration of prophylactic vaccines against HPV. Two vaccines are available based on the recombinant expression and self-assembly of the L1 HPV protein into virus-like particles, and so therefore are not classed as live versions of the targeted viruses. The two vaccines on the market at present target different strains of the virus, although both target the two highest-risk strains (however see p15regarding other untargeted strains): Cervarix (GlaxoSmithKline) protects against HPV16 and HPV18, while Gardasil (Merck & Co., Inc.) also protects against HPV6 and HPV11, which are also associated with genital warts. Genital warts are a relatively common sexually-transmitted infection; just under

100,000 new cases of which are recorded per annum in statistics provided by an independent UK health advisory organisation (Health Protection Agency, 2009).

These two vaccines have been evaluated in a number of large scale randomised-controlled trials (Garland et al., 2007b; FUTURE II study group, 2007; Villa et al., 2005; Harper et al., 2004). These trials show encouraging levels of efficacy for the available vaccines for the prevention of HPV infection: in Garland et al.'s (2007) trial of the quadrivalent vaccine, per-protocol analysis showed vaccination to be 100% effective in preventing CIN or adenocarcinoma of the type associated with HPV16 and 18 in comparison with a placebo group (participants receiving less than the recommended three doses showed slightly lower efficacy). Because the benefit of an HPV vaccination programme depends upon efficacy in all vaccinated women regardless of baseline HPV status and other practical factors, intention-to-treat analyses were also carried out to reflect these; here vaccination reduced the rate of detected cervical lesions by 20%. The study by Villa et al. (2005), also of the quadrivalent vaccine, reported a per-protocol reduction of 90% in persistent HPV infection (of the strains vaccinated against) or disease, along with an 89% reduction in HPV infection (again in targeted strains only) in a modified intention-to-treat analysis (received at least one dose) versus controls. Similarly, Harper et al. (2004) reported a 100% reduction in persistent infection with targeted strains by the bivalent vaccine via per-protocol analysis, and a 95% reduction in intention-to-treat analyses; the higher efficacy suggested by the latter finding than in other studies (e.g. Garland et al., 2007a) is likely due to this study's requirements that participants were HPV negative at the outset of testing. Intention to treat analysis in Harper et al. (2004) also showed a 93% reduction in cytological abnormalities of the types associated with the vaccine-targeted strains. A recent paper combining data collated from the FUTURE 1 and 2 studies of the quadrivalent HPV vaccine, comprising more than 17000 female participants aged 16-26 across 24 countries and territories over four years (FUTURE I/II study group, 2010) showed 96% vaccine efficacy in prevention of CIN1 associated with the targeted strains in per-protocol analyses, and 69% in equivalent intention-to-treat analyses. 30% overall efficacy was shown in the generally naïve population against the development of any lesion (including those not targeted by the vaccine), with 20% efficacy shown in equivalent intention-to-treat analyses. This study illustrates that although the vaccination affords protection against infection and subsequent disease in those

individuals who are HPV naïve and adhere to stated dose guidelines, protection will not be complete in the general population due to the effects of non-vaccinated strains, varying adherence to guidelines and previous exposure to HPV. This latter point also has implications for vaccination programmes: to reduce risk of previous exposure to the virus, vaccination should occur before sexual activity has occurred.

While studies have demonstrated the efficacy of Gardasil and Cervarix in preventing infection and cervical disease (e.g. Villa et al., 2005; Harper et al., 2004; see p19) the duration of protection afforded by vaccination is somewhat less clear. Given that naturally-occurring HPV infections do not always produce detectable antibodies, prospective studies cannot use HPV antibodies as correlates of vaccine-induced immunity (Saslow et al., 2007). This issue influences decisions over age of vaccination because the vaccine has to be administered prior to initial HPV infection; and given the prevalence of HPV infections, this should be equated with first sexual contact (which need not necessarily include penetrative sex). One argument in considering the optimum age of vaccination is the magnitude of the immune response; Block et al. (Block et al., 2006) showed that immune responses are superior when the recipient is 10-15 years of age compared to the responses of 16-23 year olds. The study by Villa et al. (2005; see also Harper et al., 2004) showed that these immune responses ranged from 60-100 times that of natural immunity after three vaccination doses as recommended. A modelling analysis of optimal ages of vaccination (French et al., 2007) found that earlier vaccination should result in a higher proportion of cases in which cervical cancer is prevented in the long term (although these findings are also subject to the previously discussed uncertainties relating to the duration of protection afforded by vaccination).

Another finding from the study by French et al. (2007) was prediction of long-term benefits for the vaccination of males. Elbasha and Dasbach (2010) carried out a modelling study of the impact of vaccinating boys as well as girls, with the authors strongly arguing for this position in the US based on cost-effectiveness. Earlier modelling research had indicated that cross-gender vaccination may not be cost effective in terms of preventing the incidence of cervical cancer in females (Sanders & Taira, 2003). Kim and Goldie (2009) also carried out a cost-effectiveness comparison of a female-only vaccination programme and one that included males. Quality

Adjusted Life-Years (QALYs) were used as an outcome here, with a female-only programme resulting in approximately $50 000 per QALY, as compared to over $100 000 for vaccinating both boys and girls (see also Insinga et al., 2007, who conducted a similar analysis in Mexico and obtained similar results in terms of higher costs per QALY when vaccinating both genders). The results of Regan et al. (2007) may provide an explanation for why some studies show benefits for vaccinating males when others do not: in this modelling analysis, the benefits of vaccinating males was shown to be greater when uptake was low in females. Indeed, in the analysis by French et al. (2007), predicted uptake across both genders was fixed at 50%. These results suggest then that the success of a female-only strategy depends on achieving high uptake rates.

Across the research summarised in this chapter so far, much is recent; in particular, the related economic and epidemiological challenges associated with the development of vaccines against HPV remain active research fields even as the vaccine is being introduced in some countries. The relationships between HPV, cervical cancer, vaccination and other protective behaviours (such as screening and condom use) contain many subtleties, as the evidence reviewed has shown. With uptake rates having shown to be important determinants of the success of any vaccination programme however, it is also necessary to review research which has examined the psychological factors surrounding public knowledge of HPV and the surrounding issues.

1.3. Psychosocial and ethical issues relating to HPV.

The processes of informing individuals about HPV are the focus of this thesis; previous studies and analyses have highlighted the potential issues that may surround HPV information provision, and these are considered in the following sections. Vaccines and mass vaccination and screening programmes can present challenging ethical issues in terms of how individuals are informed about these programmes, relating to formal consent to be screened or vaccinated, and ensuring that individuals are in a position to be making informed decisions about their own health.

The extent to which women are already informed about HPV can be examined by reviewing past assessments of levels of knowledge and awareness of HPV in the UK and other populations. Potential sources of HPV knowledge are also considered in this chapter; in particular, special consideration is given over to the possibility of women receiving information about HPV via the media, and the discussions of morality that have ensued. A more general consideration of what previous literature has established as common psychological responses to HPV information is also necessary, including emotional responses and changes in behaviour or behavioural intentions. If general HPV awareness in the UK's target population does not meet the requirements of informed consent, then information provision must be considered, along with the associated emotional and behavioural impact of informing women about HPV; as suggested by the previous section (p112), achieving high uptake rates is necessary in order for the vaccination programme to have cost-effective benefits on patterns of disease.

1.3.1. Informed consent.

Informed consent concerns the provision of adequate information to individuals ahead of a treatment or other procedure, including screening; previous research on informed consent has therefore considered a range of principles and arguments affecting and relating to information provision. Applebaum et al. (1987) propose four requirements for informed consent in a general medical context. The first is assurance that the patient has a right to freedom of choice in their treatment decision, and the second that explanations are provided regarding the purpose of the treatment, its associated potential risks and benefits, and any alternative available treatments. The remaining two requirements relate to the assessment of the patient's decision-making ability: the patient must have the capacity to make the necessary decision, and the patient's understanding of the given information must be verified. The General Medical Council's 2008 guidelines for professionals seeking informed consent when providing treatments builds on these four requirements (General Medical Council, 2008) by adding guidance in evaluating whether adequate consent has been obtained for a decision: the clinician needs to consider whether the patient has understood the provided information, and whether they consider the patient to have been coerced or pressured,

including by clinicians themselves. (These guidelines can be compared with a policy report by the US Health Care Financing Administration, 1999, however, which suggests that patients can provide consent without having to understand all aspects of the treatment or intervention and therefore would not require rigorous examination to ensure that they have absorbed and understood given information.) These guidelines illustrate the balance that clinicians must aim towards: attempting to provide information that circumvents external biases and pressures on the patient while themselves avoiding coercion.

Researchers have considered informed consent in vaccination: for example, Field and Caplan (2008) take the view that personal autonomy must always be 'balanced' against state-directed initiatives such as vaccination programmes. Field and Caplan approach the issue from a bioethics perspective, and place the topic of HPV vaccination within a broader context of ethical frameworks underlying vaccination mandates; the authors suggest that any mandatory action – the strongest form of which may be a compulsory vaccination scheme, but would also include noncompliance with informed consent guidelines – must be balanced against potential loss of autonomy and patient decision-making. This idea of tension between two conflicting principles is again reinforced by the analysis of patient autonomy in health provided by Kapp (2007), where the author concludes that neither full individual autonomy nor state mandate would provide a workable implementation, and that consumer-driven health care will always require a practical compromise to be drawn. Kissam et al. (2004) discuss the varieties of consent that can be obtained for influenza and pneumococcal polysaccharide vaccination, stating that although obtaining informed consent is essential prior to the administration of any invasive treatment – even a preventative one such as a vaccination – there is a balance between ensuring this consent and impeding the abilities of health care providers to implement effective programmes, reflecting the issues of tension and balance between competing public health concerns and ethical principles discussed earlier.

More specifically, a number of opinion pieces and editorials have provided broad overviews of controversies surrounding informed consent in HPV vaccination: Colgrove (2006), examining the case of a mandatory vaccination programme introduced in the US state of Michigan, asks whether obtaining high levels of

vaccination uptake is a goal worthy of bypassing informed consent, given that it would therefore infringe upon individual and parental autonomy in the process. Furthermore Colgrove highlights the importance of counterarguments against mandatory programmes emerging from many sources; indeed Gollust et al. (2010) conducted a survey of public attitudes towards vaccination following media coverage of the Michigan controversy, with their results suggesting that support for the programme waned in relation to levels of coverage. Lo (2006a) makes the similar point that coerced vaccination should not be acceptable unless there is a clear health emergency in progress, and also that encouraging HPV vaccination as a routine process is short-sighted and may have future unforeseen consequences (although these are not specified); this also corresponds with Field and Caplan's (2008; as previously discussed, p23) assertion that relative benefit of mandatory actions is relevant to the current health context, with mandatory actions assigned greater value and benefit when there is a stronger public health threat. An extensive review of challenges in policy and ethics relating to HPV vaccination is provided by Javitt, Berkowitz and Gostin (2008); considering issues of health outcomes, former precedent and historical justification and issues of long-term safety and compliance, the authors argue against the current case for mandatory vaccination. Little attention is given over to discussions of informed consent in this review, however.

There are few in-depth studies of informed consent in HPV testing and, surprisingly, vaccination beyond the aforementioned editorials and policy reviews. Brabin, Roberts and Kitchener (2007) carried out a semi-qualitative analysis of parental views regarding provision of HPV vaccination without parental consent. Polarised views were shown; whereas some respondents focussed on the importance of autonomy on the part of the child receiving vaccination, other parents emphasised that their involvement in the decision to accept vaccination was crucial and necessary. There are however studies of general HPV awareness and understanding, and these are reviewed later in this chapter (see p31); of immediate relevance are studies of knowledge in those who have been involved in mass vaccination programmes. Cooper-Robbins et al. (2010) conducted a series of interviews and focus groups in Australian schools to examine this issue, and found themes emerging that suggested poor knowledge in even those who had received the vaccine. Brabin et al. (2010) also conducted a survey of 1084 12-13 year-old girls who had previously viewed an educational film on HPV alongside an offer of

vaccination; at the time of testing 6 months on, poor knowledge was shown about HPV and cervical cancer, with many of the key messages forgotten or unclear. While both of these studies were conducted some time after the initial offer of vaccination (6 months in the study by Brabin et al. and a variable time of 1-8 months in the Cooper-Robbins et al. study) therefore introducing the possibility that the information may simply have been forgotten.

1.3.1.1. Informed decision-making.

In the studies discussed in section 1.3.1, it could be observed that more recent studies of informed consent have considered the role of personal autonomy. Studies have considered the relationship between information provision and personal autonomy in more detail by examining informed decision-making, which relates specifically to supporting patients in health-related decision-making. A definition is offered by Rimer et al. (2004) as "occurring when an individual understands the disease or condition being addressed and comprehends what the clinical service involves, including its benefits, risks, limitations, alternatives, and uncertainties; has considered his or her preferences and makes a decision consistent with them; and believes he or she has participated in decision making at the level desired" (Rimer et al., 2004; p1214). Whitney et al. (2004) make the following distinction between informed consent and decision-making: informed consent is involved when the clinical course of action is clear, and informed decision-making is involved when two or more reasonable alternatives exist. By this token however, vaccination could be classed as either informed consent or informed decision-making depending on the perspectives of clinicians or policymakers; an effective vaccine with obvious benefits may be considered a 'clear' course of action, but there remains the decision to accept or deny vaccination as alternative treatment options. Evidence relating to informed decision-making is therefore also of relevance, as informed consent and decision-making share ethical arguments and there are relevant practical recommendations that may be useful as regards HPV vaccination.

In the previous section, studies by Cooper-Robbins et al. and Brabin et al. (2010) were discussed (see p24); here, adolescents from whom informed consent to be vaccinated

had been obtained showed poor knowledge about HPV even a short period of time later. From these studies it seems likely that some vaccine recipients would not have been making fully informed decisions when accepting vaccination. Studies and opinion pieces have also examined informed decision making in relation to screening and vaccination more specifically. An editorial by Austoker (2003) argues that provision of natural frequency data and information about the possible risks involved in screening participation may prove discouraging to patients, and that providing more information may well alert patients to possible negative outcomes of being tested and therefore impact uptake. Gotzsche et al. (2009), in discussing breast cancer screening, extend this point by considering the extent of the harms that may arise from mammography attendance, including unnecessary treatment and anxiety following false positive results. The authors do not argue against mammography in general, but that a more comprehensive range of information is provided such that women can make fully informed decisions about screening. This may raise the earlier concerns surrounding the balance of uptake and information provision (as discussed on p23); however, Dormandy and Michie (2004) showed that uptake of a screening behaviour (in this case prenatal screening for Down's syndrome) was higher when participants made an informed decision, with socioeconomic differences in uptake being explained by differences levels of informed choice given high enough knowledge. Dormandy and Michie's method of assessing informed choice considered attitude-behaviour congruency, so it may be that these findings depend on existing attitudes about the screening behaviour in questions: these methods are described in more detail in the following chapter (p48). Similarly, Dahl et al. (2011) showed an association between prenatal screening uptake and knowledge of the test, showing that knowledge of prenatal screening did not influence anxiety. Furthermore, Marteau et al. (2010) have also showed that use of an intervention designed to boost informed consent need not necessarily affect uptake rates: in a randomised-controlled trial designed to examine the impact of an invitation letter for diabetes screening emphasising informed consent versus a standard invitation letter, no differences in uptake were observed between the two groups.

In summary of both the reviews of evidence in both informed consent and decision-making, adequate knowledge about possible disease outcomes and treatment options is essential both in terms of obtaining informed consent to a procedure (including

screening or vaccination) and proving individuals with the background information to make decisions about their own health. Studies of awareness of HPV in the UK and other countries will be examined later in this chapter (see p31).

1.3.2. Ethical and moral arguments.

There has also been concern from some quarters regarding the 'moral' issue of vaccinating against a sexually transmitted infection in young women: an editorial by Lo (2006b) discusses the reactions of conservative organisations who have expressed concern that the administration of a vaccine against an STI may result in changes in sexual behaviour. This relates to the concept of risk compensation (Wilde, 1976; Adams, 1985; Adams, 1988), wherein individual risk-taking decisions represent a balancing act in which perceptions of risk are weighed against propensity to take risk (Adams, 2009), and studies of risk compensation may examine whether changes in behaviour are observed following a change in risk perceptions (for example, after vaccination). Two studies have looked at direct risk compensation effects: a study by Brewer et al. (2007) examining risk compensation effects following vaccination against Lyme disease found some decreases in protective behaviours following vaccination, but not below the levels of an unvaccinated group. It should be noted, however, that vaccination against Lyme disease was available by request in this study's sample, and results may differ with an opt-out programme. Marlow et al. (2009) carried out two surveys to examine whether mothers' and adolescent girls' beliefs about whether HPV vaccination would cause risk compensation effects, finding that a 'significant minority' held such beliefs (with previous behaviours and socioeconomic factors emerging as predictors of these beliefs). From the limited evidence available, it appears unclear as to whether risk compensation effects can be predicted following HPV vaccination.

Arguments relating to moral issues and behaviour change have been used by conservative or vaccine-sceptical commentators and organisations, a number of whom have been painted as opposing official vaccination programmes in media reports; in Hilton et al.'s (2010) content analysis of UK newspaper articles between 2005 and 2008, Christian and Islamic religious groups were observed to express concerns over the vaccine as 'a green light for sex.' A similar study conducted in the US and Canada

(Abdelmutt & Hoffman-Goetz, 2009) showed similar messages being generated by religious groups, though also showed that local variations affected the type of coverage: for example, more negative coverage was observed in areas with influential Catholic school boards.

While it may be tempting to dismiss these moral concerns as relating only to the media and a small number of highly vocal organisations, Colgrove (2006), in a discussion of potential mandatory vaccination programmes, urges policymakers and researchers to remember that a decision to accept HPV vaccination and testing is not of one choosing scientific progress over religion or ludditism; rather, a decision that may be influenced by a range of general socio-economic and psychological factors and local political, philosophical and ideological – as well as spiritual – arguments. In summary, ethical and moral arguments relating to HPV should supplement the earlier-discussed concerns surrounding knowledge, consent and decision-making; these arguments may reflect genuine concerns held by individuals about HPV and vaccination.

1.3.3. Channels of information provision.

Of the routes by which individuals may obtain health information, research has focussed on three: these are print information, the media and the internet, with the latter two the most prominently studied in relation to HPV information. The role of print information is considered more generally in Chapter 3 of this thesis (see from p81). In terms of the media, Hilton et al. (2010), in carrying out a content analysis of articles published about the HPV vaccine between 2005 and 2008 in UK newspapers identified 344 articles on the subject. Newspaper coverage as a route of information provision is of concern because of past media controversies: UK newspapers for example have played on lingering fears relating to MMR vaccination and general anti-vaccine sentiment, and these are identified by Hilton et al. (2010) as a theme that persists even in articles about HPV. The controversy over MMR in the UK continues to have an impact upon uptake of the vaccine (Friederichs et al., 2006), with ensuing high measles rates in the UK (Kremer & Muller, 2009). Smith et al. (2007) present a review of surveys tracking mother's attitudes to MMR immunisation over the duration of the

controversy surrounding the vaccine, suggesting that variations in results were susceptible to trends in media coverage.

The research described in this thesis was carried out during a two-year period preceding the introduction of the vaccination programme in the UK. Over this period, many individuals may have been introduced to the topic of HPV through the media, and studies have examined the number of HPV-related articles and their contents. Forster et al. (2010) used qualitative framework analyses to examine media messages published between 2003 and 2008 for the presence of arguments relating to risk compensation (as discussed previously; see p27). Here while there was a broad mix of positive and negatively framed messages, a trend was observed whereby more articles mentioned negative behavioural consequences over time; when it was announced that the UK government was considering mass immunisation, all articles reviewed mentioned negative behaviours. In the Hilton et al. study (2010) the majority of coverage analysed in newspapers was broadly positive, and furthermore accuracy of information increased over time; however, the inclusion of positive and factual content was often accompanied by more speculative content on women's sexual behaviours and the possibility that vaccination may increase promiscuity.

These trends in HPV-related media coverage are not unique to the UK, and studies in the US have shown similar results. In a content analysis of more than 100 US articles between 1995 and 2002, there was little cohesion in terms of topic of emphasis or included facts (Anhang et al., 2004). Around 30% of the stories focussed on HPV's link with cancer, and 27% on HPV's status as an STI (and the related link with genital warts). Only around 1 in 4 mentioned that a diagnosis of HPV will not necessarily lead to an eventual diagnosis of cervical carcinoma. Calloway (2006) in a similar US study of 25 articles identified in 2003, 2004 and 2005, had similar concerns about provision of detailed information about HPV, and speculated that the articles reviewed did not provide sufficient indication of the complexity of the issues surrounding HPV.

It is unfortunate that no content analyses have been carried out of media coverage in the Netherlands, however, where a sustained media campaign promoting anti-vaccination messages was staged, and the media provided coverage of a debate between prominent Dutch clinicians and scientists over the safety of the vaccine and need for vaccination.

A study of determinants of vaccine uptake across the Netherlands showed large regional variations in uptake, ranging from 31% to 61% at first dose (Rondy et al., 2010) but did not attempt to assess the media impact (although the authors suggested that regional factors may be reflecting religious views by geographical clustering, with some anti-vaccination messages being targeted within specific religious groups).

Recent findings using data from the US Health Information National Trends Survey have demonstrated that the internet has become the preferred first source of health information for many individuals (Hesse et al., 2005; Rains, 2007). These studies also showed that a small number of respondents used magazines as their primary source of information provision about cancer. Although this proportion was only around 5-10%, this group represents a potentially much wider issue; that many individuals absorb information through media-channels on a day-to-day basis and not during specific instances of information seeking.

Individuals using the internet to seek information about HPV may also likely encounter inconsistent information, or information which openly (and sometimes aggressively) or more subtly promotes an anti-vaccination stance, although this issue appears to be becoming less pronounced more recently. Davies et al. (2002) examined the availability of anti-vaccination messages to individuals browsing the internet using well-known search tools, finding that 43% of all hits obtained on the first pages of returned results contained anti-vaccination messages. More recently, Habel, Liddon and Stryker (2009) conducted a content analysis of 250 internet articles about HPV sampled between June and September 2006, finding that a higher number of these (around 50%) presented balanced coverage of the issues involved than the earlier study by Davies et al.

While there appears to have been a significant amount of coverage afforded to HPV and HPV vaccination in the media, the quality of which appears to have improved over time, much of it has included (and continues to include) incomplete factual information, and a minority of information (particularly that found on the internet) has been presented in context of a vaccine-sceptical agenda. In light of the discussions of informed consent and decision-making presented earlier in this chapter, media

information sources do not appear to fulfil the requirements for informing women about HPV ahead of vaccination decisions.

1.3.4. Awareness of HPV

Awareness and knowledge of HPV and its relationship with cervical cancer is not only useful information for women in terms of their own health; as discussed previously in the section on informed consent (see p22), it is also a necessary prerequisite for health-related decision-making with regard to cervical screening and now, in some individuals, vaccination (for oneself or a person in their care). Many studies indicate that women's awareness of HPV as a risk factor for cervical cancer is poor, however. Cuschieri et al. (2006) conducted a review of available evidence relating to awareness of HPV in the general UK population, concluding that knowledge was not only low, but subject to a great deal of confusion. This review was non-systematic however, and all of the studies reviewed were conducted before the media coverage of HPV surrounding the introduction of the vaccine. Waller et al.'s earlier study in 2003 involved conducting an HPV knowledge survey of 1032 UK women attending a well-woman clinic, and had found that 30% of respondents had heard of HPV (in a prompted recognition question); but even among those respondents, less than half were aware of the link with cervical cancer. Two studies conducted in 2002 and 2007 surveyed representative population samples of UK women about their beliefs about risk factors for cervical cancer: Waller et al. (2004) surveyed 1940 women, and Marlow et al. (2007) conducted a further survey of 1620 women. The latter article concluded that in the UK at least, HPV knowledge had showed little improvement between 2004 and 2007: in unprompted knowledge that HPV is a cause of cervical cancer there was a rise from .9% to 2.5%. In this same survey however, awareness of HPV in response to the question 'have you heard of human papillomavirus (HPV)' was placed at around 25%; that this figure is slightly lower than the 30% reported by Waller et al.'s (2003b) sample attending a well-woman clinic can be explained by lower awareness in the general population than those women attending a clinic. While these studies demonstrate that there is low recognition for the term HPV, explicit knowledge that HPV is a causal risk factor for cervical cancer was even poorer in response to open or unprompted questions; this is reflected in the results of the systematic review presented by Klug et al. (2008). Across 39

studies of HPV awareness published between 1992 and 2006 across countries, much variation in knowledge could be showed across studies, though this depended largely upon question format: for example, proportions of respondents having heard about the term HPV ranged from 13% to 93%, but unprompted knowledge of the causal role of HPV in cervical cancer only varied from between 6% and 11%.

Demographic factors may also play a role in determining awareness: Waller et al. (2003a) obtained small (though significant) associations between higher knowledge of HPV and age. It has also been suggested that lower HPV knowledge may be associated with ethnic minority status (Cuschieri et al., 2006), although existing findings are mixed or inconclusive. Mays et al. (2000), for example, found particularly low levels of HPV awareness in 40 participants drawn largely from minority demographics, but recognised the problems of making inferences from a small, non-representative sample. One study examining Chinese-American women in Washington observed different patterns of cervical cancer risk factor knowledge than those studies not targeting minority groups (Ralston et al., 2003) but similar levels of knowledge with similarly sized primarily-white samples. A cross-sectional nationwide survey in the US (Tiro et al., 2007) demonstrated that participants from a white background were likely to have higher awareness of HPV, but this finding did not carry across into more explicit knowledge about the infection and its link with cervical cancer. Marlow, Waller and Wardle (2009b), in an exploratory qualitative study of the attitudes of ethnic minority mothers in the UK, found that most interviewees had not heard of HPV, and concerns over culturally-specific barriers to vaccination were commonly reported.

1.3.4.1 Awareness of HPV in adolescents and parents.

The studies of awareness discussed in the previous section focussed on HPV knowledge in adult populations; the vaccination programme in the UK is however targeted at adolescent-age females, and much less is known about knowledge in adolescents. There is some evidence about HPV knowledge of adolescents from other countries: poor knowledge about HPV has been reported in adolescent students aged 15-19 in Canada (Dell et al., 2000). This study surveyed all schools (523 in total) in the inner-city Toronto area, providing a comprehensive range of demographics within

urban areas, and showed that 87% of respondents had not heard of HPV (although it is not clear whether this question was prompted or unprompted). Educators and school health staff (that is, those professionals who represent a possible avenue of health information provision for such students) in 79 schools across the state of Vermont, USA were surveyed to examine the level of HPV knowledge held by these individuals: eight questions assessing basic HPV knowledge were asked, and across all respondents, correct answers were only given in 60% of responses (Beatty et al., 2003). However, these findings preceded the recent publicity associated with the vaccine. In a more recent survey of all 9th grade students in a single city in Finland (with all city schools surveyed, resulting in 1874 responses), only 33% of 15-year olds had heard of the virus, although 83% would be willing to receive the vaccine (Woodhall et al., 2007); however on-going reluctance to approve the available vaccines in Finland may have affected local publicity.

Vogtmann et al. (2011) conducted a study of HPV knowledge in Mexico where, in 2009, a state-funded vaccination programme commenced. 1109 Mexican 17-25 year-olds (including both males and females in this sample) were surveyed: similar to the findings discussed earlier in this chapter (in the review of adult HPV awareness studies: see p31) most had heard of HPV (83% of respondents) but achieved only middling scores on a novel 10-item index of HPV knowledge (median score 5 items correct). This study showed clear effects of socio-economic status and previous sexual experience as predictors of knowledge; participants were less likely to have heard of HPV and produce lower scores on the index if they were of a lower socio-economic status and did not have sexual experience. Unlike the earlier studies discussed in this section however, this survey was only conducted at a single university site, and though socio-economic status was showed to be a predictor of performance it may have been that the sample, recruited from a university, had higher overall socio-economic status than the country's general population. The authors therefore acknowledged that while low socio-economic status was a predictor of knowledge, not enough students of low socio-economic status were tested to explore the reasons and mechanisms behind these effects.

Two recent related studies discussed earlier in this chapter (see p24) may also be reconsidered; though not surveying levels of HPV knowledge in the general population,

Brabin et al. (2010) and Cooper-Robbins et al. (2010) examined retention of HPV information over a period of months. Adolescent girls were given information about HPV and the vaccine and subsequently tested for their knowledge some time after the event (this was at a time period of 6 months in the study by Brabin et al. and a variable time of 1-8 months in the Cooper-Robbins et al. study). The Brabin et al. study surveyed around 1000 students in the Manchester (UK) area as part of a pilot trial offering the HPV vaccine to 12-13 year old girls from a number of schools, and despite efforts made to provide information at the time of vaccination being offered (including production of a short film), retention of HPV knowledge at 6 months was poor. This was assessed by asking what, if anything, girls recalled from the film; only 42% of respondents were able to recall a single fact or more. Cooper-Robbins et al.'s (2010) study was a qualitative examination of HPV information knowledge in adolescent Australian girls who had participated in state-provided vaccination (along with their parents) via thematic analysis, and showed not only a lack of general knowledge about HPV but also specific confusions. Some of these confusions related to other protective recommendations (including whether condoms would provide protect against HPV infections). Confusion was also expressed by some respondents about the overall relationship between HPV, vaccination, screening and cervical cancer: for example, there was a lack of certainty about whether screening would still be necessary after receiving the vaccine. On a related issue, many participants were unsure of what the vaccines protected against: some understood that the vaccine protected against HPV (as a precursor to cervical cancer) but others thought the vaccine was against cervical cancer itself. Some thought that it would provide protection against other STIs, but genital warts were not mentioned in relation to this. It is not clear from this study however the amount or type of information provision that took place at the time of vaccination.

Evidence about HPV knowledge in adolescents is limited to a small number of studies spread across various countries, and these are confounded by the varying methodologies used, levels of publicity and different policy across these countries. Neither is it clear that knowledge is superior in those countries where a state-funded vaccination programme is in place; though Vogtman et al. (2010) showed reasonable knowledge in university students, those results may not be comparable with other

countries. Notably, evidence about HPV knowledge in adolescents in the UK is particularly lacking.

1.3.5. Responses to HPV information.

A number of studies have examined women's emotional and psychological responses to HPV information through various methodologies. These studies can be split into those concerned with responses in a clinical HPV testing context and those examining instances of information provision only. Of the latter type, a small number of studies can also be identified which examine responses to information in adolescents and parents. Section 1.3.5.4 is then dedicated to behavioural responses: studies have considered the factors influencing uptake of HPV vaccination, and the procedures of these studies often include an instance of information provision, though generally also consider other predictors of uptake besides knowledge.

1.3.5.1. Responses in an HPV testing context.

Studies have used HPV testing contexts as an opportunity to examine women's responses to information about HPV. There is significant variation in contexts between many of these studies however; in some cases the attendance at screening is used an opportunity for information provision, but in others information is provided following a clinical diagnosis. Qualitative investigations of women's beliefs about HPV and cervical cancer have been carried out following HPV testing. Waller et al. (2005c) interviewed 74 women to assess psychological and emotional responses following participation in HPV screening andpresentation of HPV information, with results indicating that the causal link between an STI and cervical cancer was perceived as a important aspect of the information in producing negative responses. Though many participants showed awareness of sexual activity as a precursor to HPV infection, HPV infection did not seem to be as easily conceptualised as a precursor to cervical cancer. The authors suggested that even following information provision, some women 'were able to maintain their model of cervical cancer separate from sexual transmission' (Waller et al., 2005b, p. 267). Other women had some level of formal or informal

knowledge about the longstanding association between sexual activity and cervical cancer, and these women were more readily able to integrate HPV infection into this chain of events. One notable group of women characterised in this study were active information seekers; that is, those who had found the concept of a sexually transmitted cause of cancer shocking or surprising, and had sought out further information on their own.

McCaffery and Irwig's (2005) study was also primarily concerned with women's information needs; 19 women were interviewed who had recently been diagnosed with HPV infection. Alongside general negative emotional responses as seen in similar studies, the authors also noted here that anxiety was linked to uncertainty, with those patients given the results of their HPV test by mail showing more anxious responses than those who were able to speak to a clinician about the diagnosis. The specific context of information provision may have been an important factor here however; the women in this study may have been especially anxious and negative about HPV information because of their recent diagnosis.

Other quantitative studies can be identified. Maissi et al. (2005) conducted a cross-sectional survey of around 1000 women, showing that those diagnosed with HPV after an abnormal smear test result were more anxious than HPV-negative or non-tested controls, and levels of anxiety in these women were predicted in part by a lack of understanding about the diagnosis and perceived risk of cervical cancer. Furthermore, whilst it might be assumed that a negative HPV result would prove reassuring to those women with abnormal smear test results, the findings did not support this, suggesting again that the positive implications of the negative result might not have been fully understood. Similarly, McCaffery et al. (2004) surveyed 428 women undergoing HPV testing, and in those women with a normal cytology result found higher state anxiety and self-evaluated distress in women diagnosed HPV positive than those diagnosed negative. In women who obtained an abnormal or unsatisfactory cytology result, more distress was reported by HPV positive than negative respondents, but not state anxiety. Perhaps more concerning is the effect of an HPV-positive diagnosis on sexual relationship-related attitudes, with more women overall reporting feeling bad about their past and future relationships following a positive than a negative HPV test result.

Across the variety of contexts and testing approaches used in these studies, the themes of anxiety, risk and uncertainty seem to be the most prevalent responses to HPV information provision in clinical settings. However, as discussed earlier, provision of HPV information in a clinical setting is often concurrent with communication of the results of and HPV test; studies conducted in non-clinical settings may occur in a information provision context only.

1.3.5.2. HPV information provision in non-clinical settings.

A smaller number of qualitative studies have examined responses to HPV information in non-clinicalcontexts, althoughindirectly in some cases, as the focus in many of these studies is prospective attitudes andbeliefspredicting the acceptibility of futurevaccination. This is the case with Olshen et al. (2005), who conducted interviews and focus groups with 25 parents; responses in this study were less extreme than those observed in studies conducted in clinical settings (although this may be expected in an information provision only context). A number of parents expressed concerns over their own decision-making ability due to their own lack of knowledge and the novelty of the information however. Another major theme that emerged was risk: some parents felt that their own children were not at risk of HPV and any associated negative effects. Waller et al. (2006b) also examined how 24 mothers viewed the prospect of vaccinating their daughters through a number of focus groups. Though few had heard of HPV before the study, mothers quickly assimilated the information. Parents were receptive to vaccination in general, but attitudes to a vaccination against cancer more mixed; some were positive, but others showed more scepticism (especially those with higher levels of education), citing other behavioural changes as possible better alternatives to vaccination.

Mays et al.'s (2000) interviews as discussed in the previous section (p32), alongside finding gaps in knowledge of HPV, also showed negative emotional responses to information about HPV. In a later study, Goldsmith et al. (2007) employed focus groups in a sample of 38 women, and although the primary aim here was to examine HPV information needs, some of the emerging themes suggested negative affect, including apprehension, uncertainty, and shock about the sexually transmissible nature

of the infection. In a quantitative study by Ramirez et al. (1997), a survey of more than one hundred university-age women in a non-clinical setting was carried out, which included a number of items assessing negative emotional responses to an imagined diagnosis with HPV. Here, similar to the previous study, most respondents selected negative words from a list to represent their predicted feelings about a diagnosis: e.g. scared, panicky, dirty and regretful.

Unlike the studies reviewed in the previous section, which examined HPV information provision in clinical settings, the studies here used information-provision only contexts. Again, the recurring themes across the studies are negative emotional responses and uncertainty over basic facts and risks; there are however instances where the prospect of vaccination is met with less emotional responses.

1.3.5.3. Responses to HPV information in adolescents and parents.

The studies of responses to HPV information discussed have examined adult populations; given that the UK vaccination programme is intended for adolescent-age females, responses in this group can be considered in more detail. Adolescents themselves are likely to take an active decision-making role, rather than relying on authority figures to provide consent (Zimet, 2005); a UK study by Brabin et al. (2009) of 12-13 year old girls in Manchester who were offered the vaccine as part of a feasibility study showed that young women of this age formed their own views and decisions on acceptance of vaccination, but also looked to parents and other authority figures for guidance. It is therefore necessary that the information needs of adolescents are considered and their reactions to learning about HPV are assessed.

Marlow et al.'s (2009) survey study of UK mothers and adolescents (as discussed previously on p27) examined responses in terms of risk compensation beliefs about HPV vaccination. Risk compensation effects in this context may include increased tendencies to take risks in sexual behaviour, such as more instances of unprotected sex; the study specifically looked at whether receiving the vaccine would encourage such risky sexual behaviour. Findings here showed that knowledge about HPV could have an impact on risk compensation beliefs; adolescent respondents with lower knowledge

of HPV were more likely to believe that vaccination would be associated with more risky sexual behaviour. A strength of this study was that it was carried out with more than 300 mothers as well as a further 300 adolescent females, and showed that socio-economic variables could affect risk compensation beliefs in both groups; the methodology of the study was, however, dependent upon hypothetical scenarios and prospective decision-making on the part of participants, and did not examine instances of real-world decision making or behaviour.

Two reviews relevant to adolescent decision-making about HPV vaccination have also been carried out, though both were non-systematic. The first, by Gamble et al. (2010), summarised research examining uptake of the vaccine by families with adolescent or pre-adolescent daughters. Though this review covers a similar range of topics to those discussed in this chapter, the authors state that current research focussing on adolescent attitudes regarding HPV vaccination is limited (both in terms of the number of studies available and their scope, including low samples and poor representativeness of those samples) compared to that carried out with adults and parents. Kollar and Kahn's (2008) review concentrated on literature which may be helpful in guiding the development of HPV-related education materials for adolescents (and covers much of the same ground as the material reviewed in this section). However the authors were only able to identify previous research relating to HPV uptake, attitudes and knowledge: no studies were identified demonstrating or testing the efficacy of existing materials against control or other forms of information. Again evidence appeared to be lacking about the effects of HPV information on recipients, and particularly those in adolescents (who, at least initially, are the most important group in terms of obtaining consent and maximising uptake for vaccination).

Finally, Chan et al.'s (2009) study, conducted in Hong Kong, can be distinguished from the studies discussed up to this point due to its use of an alternative research design to examine both HPV-related knowledge and behaviour. 250 adolescent girls recruited from a paediatric gynaecology clinic completed a questionnaire examining attitudes and knowledge of HPV both before and after reading an information leaflet about HPV vaccination (emotional or attitudinal responses were not assessed in this study however). The results showed that initial intentions to receive the vaccine were boosted from 35% to 69% following presentation of the leaflet. Both knowledge and attitudes

(about who should receive the vaccine) predicted intentions. Two studies of prospective vaccination uptake in response to presentation of HPV information have also been conducted (Davies et al., 2004, and Dempsey et al., 2006, see p42 for further discussion of these studies); showing similar results in terms of decision-making and information provision in older women. The study by Chan et al. used no control conditions however, and the repeat measures design of the study, which can be more time and cost intensive than a cross-sectional survey, may have been the reason for this study's limited scope; confidence in the study's findings is possibly limited by the small sample, and it is difficult to estimate the representativeness of the sample (mainly due to the single point of recruitment to the study).

The lack of evidence about adolescents' responses to HPV information is an important shortcoming for a number of reasons. Firstly, in section 1.4 (p22), a number of studies and commentaries were reviewed regarding medical ethics, and the relevant conclusions drawn to these studies were women consenting to vaccination should have a certain level of knowledge about the treatment, its associated risks and benefits, and any available alternatives. There is currently no evidence base for what constitutes a minimum level of knowledge, or how this may also impact uptake. Secondly, information-providers may face problems in attempting to impart HPV information to adolescent-age girls: HPV information has some relatively subtle complexities in comparison to other health information topics that are commonly given to girls of this age (as suggested by evidence reviewed earlier in this section, e.g. Cooper-Robbins et al. 2010, and discussed in more detail later in this chapter; p43). Also, there is the possibility that the affective content of HPV information may have an impact on how it is received. Qualitative evidence to date in adult women (see those studies discussed in section 1.3.6.2, p37) suggests that the provision of HPV information may provoke negative affect; for example, investigations of women's beliefs about the aetiology of cervical cancer indicated that the link between sexual activity and cervical cancer is often perceived as a shocking aspect of the information (as demonstrated in three studies: Waller et al., 2005; Waller et al., 2006; Anhang et al., 2004). However the emotional impact of HPV information has rarely been quantitatively measured outside of the clinical context of HPV testing, with the emotional responses of adolescents even less well understood.

1.3.5.4 Behavioural responses and vaccine uptake.

Some quantitative studies have focussed on behavioural responses (and therefore prospective vaccine uptake) to HPV information though also considered how other factors act as predictors to these behavioural responses. For example, Zimet et al. (2000) conducted a small study of the potential acceptability of future HPV vaccination in 20 women attending an STI clinic in the US. Mixed methods were employed: during the interview sessions various factors were explored which would facilitate uptake by ranking various vaccination scenarios, and the most important of these appeared to be efficacy, recommendation from health professionals and cost. Wider psychological responses and knowledge were not considered here however. A simpler survey study of knowledge and intentions in 60 females aged 15-28 by Hoover et al. (Hoover et al., 2000) carried out in the US showed limited knowledge of HPV throughout, but tentative positive intentions towards future vaccination against HPV and/or genital warts. Only 30% expressed willingness to participate in clinical trials for any such vaccines however, although one interpretation of this may be that clinical trials are viewed as less safe and/or efficacious than the use of fully tested products, rather than specific concerns over the HPV vaccine. Note that this study did not separate out intentions toward HPV and genital wart vaccinations, and unfortunately did not note any issues of special interest or significance to younger participants. Also participants in this study were recruited opportunistically from four public sites in New Jersey; this combined with the small sample makes implications difficult to draw from this study.

The purpose of Boehner et al.'s (2003) survey of 259 students in the US was also to examine predictors of and barriers to vaccine uptake. Barriers identified were cost and safety concerns, and susceptibility to disease and number of past sexual partners were both associated with uptake; however, it was also suggested that perceived risk may be an important predictor of acceptance of vaccination for oneself. This study demonstrates that knowledge of HPV and the opportunity for vaccination alone (hypothetical or otherwise) is not sufficient to predict that vaccination will be accepted: there are other factors, practical and attitudinal, that influence decision-making. Other studies have also suggested that this is the case: Gerend et al. (2007) used mixed qualitative and quantitative methods to examine vaccine acceptance in a sample of 58

low-income minority women in the US. High personal acceptance was shown here, and all women were interested in having their children vaccinated; again however, perceived risk and safety were significant predictors for vaccination. Kahn et al. (2003) focused on attitudes and beliefs as predictors of behaviour following provision of basic HPV information; those most likely to accept vaccination were more likely to be knowledgeable about HPV, have positive general beliefs about vaccination and have had a higher number of sexual partners in the past (relating again to risk perceptions). Slomovitz et al. (2006) used a brief survey to examine vaccination uptake in 200 women, also querying reasoning behind the decision in those who declined: again, safety concerns and lack of perceived risk due to low levels of sexual activity were shown to be the most significant barriers to uptake both for oneself and children.

A systematic review carried out by Brewer and Fazekas (2007) conducted identified 28 studies (21 of which were quantitative, and 19 of which were surveys; although some of the included studies focussed on testing, e.g. Ramirez et al., 1997, or knowledge alone, and many were conducted in the US) in order to examine parents' and guardians' attitudes to vaccination against HPV in their children. Most of the studies reviewed included a component of HPV information provision (though the authors did not distinguish between the reviewed studies on the basis of the information provided). Only two studies reviewed by Brewer and Fazekas (2007) contained an experimental component, as mentioned earlier (see p40) these were Davis et al. (2004) and Dempsey et al. (2006). These two studies provide examples of quantitative studies focussing on information provision only. Dempsey et al. (2006) randomised 1600 participants (either parents or guardians of adolescents of eligible age for HPV vaccination) to receive either basic information about HPV, or an extended information sheet outlining the epidemiology and potential clinical consequences of HPV infection. A single time-point survey was used to assess responses to the provided information in terms of knowledge and behavioural intentions (in terms of prospective willingness for a dependent to receive vaccination), showing that the extended information sheet had a positive outcome on knowledge but not intentions; considered in light of the earlier discussion of the ethics of information provision, this finding suggests that enhancing knowledge does not necessarily lead to behaviour change. Davis et al. (2004) also examined knowledge and willingness for a dependent to receive vaccination in 575 parents and guardians following provision of an information sheet; however, unlike the

Davis et al. study, a repeat-measures design was employed, with baseline and post-information provision assessments compared. In this case results were broadly positive: provision of the leaflet increased knowledge and acceptance of vaccination for children. Despite the smaller sample used in this study as compared with Dempsey et al. (2006) the repeat measures design may have been an important factor in showing boosts in uptake.

1.3.5.5. Responses to HPV information: summary

The literature reviewed in this chapter has shown that negative emotional responses to HPV information can occur – in both contexts of information provision alone (p37) and alongside diagnoses of HPV-positive results (p35) – in both qualitative and quantitative studies, although certain aspects of the information – specifically vaccination –were observed to elicit more mixed responses (particularly in a context of information provision only). Furthermore, studies of vaccine uptake and knowledge suggest that knowing about HPV and the availability of vaccines is not sufficient to guarantee uptake; a range of associated psychological responses such as risk, efficacy and severity perceptions appear to be associated with prospective uptake. In addition, studies show some problems that individuals have in assimilating HPV information: as Waller et al.'s (2005; as discussed on p35) qualitative study showed, some concepts relating to HPV – such as the chain of progression from infection to cervical cancer – are complex and difficult to grasp from information provision. However, participants deemed this piece of information important; it therefore needs to be included in public information in a way that is easily understood. Difficult characteristics of HPV information will be discussed in the following section.

1.3.6. Challenges specific to HPV information provision.

Given the low levels of HPV awareness observed (see p31), it is worthwhile considering whether specific aspects of HPV information could cause difficulties in terms of information provision and education. One may be that preconceptions of STIs may not fit comfortably with lay understandings of cancer. An experimental study of

attribution factors in predicting responses to common stigmas by Weiner et al. (1988) suggests that people with sexually-transmitted infections may be perceived as having greater 'responsibility' for their illness than those with cancer. This may be because cancer (with the exceptions of lung and perhaps skin cancer) is not widely perceived as having a basis in autonomous behaviours. This perception may shift in the coming years with the discovery of more viral and behavioural risk factors for cancer; for the time being however, awareness of viral causes of cancer is low, as demonstrated by a recent cross-sectional UK survey of 4233 respondents (Redeker et al., 2008), and in contrast with high awareness of smoking as a cause. This study employed a measure of recognition knowledge, with possible causes of cancer being presented in a prompted list, and participants identifying those which they recognised as a cause of cancer.

Following the earlier discussion of the ethics of information provision in both obtaining consent and ensuring informed decision-making (p22), achieving informed consent is as much concerned with ensuring information has in fact been understood (although not necessarily complied with) as with information provision, per se (see section 1.3.4 for a discussion of the challenges involved in assessing this; p22). It would follow therefore that one of the challenges of providing HPV information is having a clear method of evaluating and verifying received knowledge.

Qualitative studies by Waller et al. (2005) and Cooper-Robbins et al. (2010) have also identified a number of specific pieces of knowledge that participants have found difficult to assimilate during provision of basic HPV information. Some of these related to the connection between HPV and cervical cancer, with many respondents in the Cooper-Robbins study using the terms interchangeably and unable to articulate the relationship between the two; this difficulty may be compounded by complexities in the development of cervical cancer, with HPV itself not associated with any symptoms but able to cause cervical cancer after many years of harmless dormancy. Conflicts between various types of protective action and behaviour are also mentioned in these studies, including uncertainties over the protection from HPV afforded by condom use, and whether cervical screening would continue to be necessary following vaccination.

Negative behavioural outcomes may also occur on the basis of emotional responses. There is evidence that individuals with high self-reported cancer fear are more likely to

avoid cancer information (Miles et al., 2008). If HPV information creates negative emotional responses, respondents may also actively avoid further information, along with offers of opportunities to engage in preventative or screening behaviours.

Hilton et al.'s (2010) content evaluation of UK newspaper articles also showed evidence of media messages that emphasised the risks of promiscuity, suggesting that HPV information may have the potential to stigmatise cervical cancer through possible associations with promiscuous sexual behaviour. It is possible that concerns and sensitivities about this issue have led information providers to be cautious about including HPV information alongside cervical cancer information; an official public information leaflet published by the NHS (Department of Health, 2007), for example, makes no mention of HPV as a risk factor. Braun and Gavey (1999), in reviewing policy documents and the approaches of cervical cancer-related policymakers in New Zealand, conclude that an approach is in place which the authors label 'protectionist' (as opposed to 'right to know') whereby the focus is firmly on cervical screening over provision of information about sexual risk factors.

1.4. Summary.

Previous evidence suggests that women's awareness of information about HPV is low (p31), and given the arguments presented regarding informed consent in healthcare (see p22), ways of informing women about HPV need to be considered in detail. There is less evidence relating to the awareness of adolescents, and that which is available shows little consistency in terms of methodology or samples; however, from the evidence available, awareness also seems to be low in this group, and studies of retention suggest that HPV information is quickly forgotten in adolescents (see evidence discussed section 1.3.5.3; p38). Furthermore, women of all ages across the world are in the process of being introduced to information about the virus through diverse channels including the media (p29). Evidence has also shown that women's responses to receiving HPV information are often negative and sometimes complex (p35); multiple qualitative and quantitative studies have been carried out, but few of these attempted to consider a broad range of psychological responses, and most were cross-sectional. The possible impact of these issues on vaccine uptake is also unclear at

this stage: as discussed previously, a range of psychological factors (such as risk, efficacy and severity perceptions) appear to be important to individuals in deciding whether to accept vaccination.

These topics provide the research questions for this thesis. Given the need to improve HPV knowledge in the general population and target populations for vaccination and testing, what is the impact of HPV information? Previous research into this question has used a mixed range of methods and approaches; can the findings from these studies be reconciled by adopting best practices and a broad range of measures in assessing responses to affective health information? The goal of the present experimental series was to create and assess the value of a paradigm for objectively measuring the psychological and behavioural impact of HPV information, which could also be applied to health information in general. Where the relative impact of HPV information is under study, it would be useful to be able to compare the types of responses participants show to this information as compared to other forms of information, health-related or otherwise; it is therefore suggested at this stage that a randomised control methodology would provide an ideal approach in operationalising this goal.

The material covered in these introductory chapters will reflect these two goals: firstly in Chapter 2, a summary of the deficiencies and outstanding questions in the HPV provision literature is presented, followed by a discussion of two theories and related research that may be able to address these issues in terms of automatic emotional responses to information and perceptions of risk and efficacy. Secondly, in Chapter 3 a review of previous attempts to perform assessments of printed information in relevant health domains is presented to highlight previous relevant methods.

2. The roles of implicit processing and fear content in information provision

2.1. Challenges for theory and methods.

The previous chapter showed that negative emotional responses have frequently been shown in response to HPV information, but that these are complex and sometimes observed alongside less affective responses which are more concerned with the pragmatic health implications of the information. (Testing positive to an HPV test however appears to be a distressing experience and a source of considerable anxiety.) In addition a number of studies have evaluated HPV knowledge, affective responses to HPV information and information needs in adult women (e.g. Waller et al., 2003; Cuschieri et al., 2006; Waller et al., 2004; Philips et al., 2003; see Chapter 1 for discussion of these and other relevant studies, p35). In general, there is low awareness of HPV both in adult women and adolescents (with little research in the UK assessing knowledge uptake in this group), and there appear to be outstanding questions about how best to best communicate HPV information to adult and adolescent-age women, with anxiety and concerns over uncertainty and risk being common psychological responses. Furthermore, existing channels of communication do not appear to be providing information to a satisfactory degree; neither the media nor internet sources reliably provide a basic summary of facts about HPV. Taken together, this combination of issues about the HPV information provision process is concerning in light of the discussions of informed consent and decision-making outlined in the previous chapter.

The role of the research described in this thesis was to address some of these immediate concerns, initially by assessing knowledge uptake in adolescent age girls around the target age of vaccination. A wider aim was to develop a testing methodology that examined a broader range of responses to HPV information relative to control information, designed to examine whether the affective properties of HPV information suggested by earlier research are more unique or extreme than might be observed in response to other forms of information. The remainder of this chapter has three purposes: firstly, to identify a possible framework for approaching the original research in this thesis, and secondly, to outline a theoretical approach and method for objectively

assessing affect. Thirdly, to introduce a further set of theory and methods for understanding the explicit responses to HPV information shown in previous studies, by considering them in terms of risk perceptions.

2.1.2. A framework for examining responses to HPV and health information.

In considering the issues of informed consent and decision-making in terms of HPV vaccination, Michie et al. (2003b) provide some practical guidance; in attempting to address some of the challenges presented by the issue of informed consent, these authors suggest a system for classifying instances of health-related decision-making using a specialised instrument (the multi-dimensional measure of informed choice). This instrument was devised and validated in an earlier study (Marteau et al., 2001b) of 225 pregnant women considering serum screening for Down syndrome, and implemented further in a larger sample of pregnant women (approximately 1500) and health professionals. According to these authors, although the provision of adequate knowledge is a necessary prerequisite for informed decision-making, it is not sufficient; measures of attitudes must also be considered. The on-going challenge may be to refine the techniques that are used to assess whether a person has received and absorbed a given piece of knowledge, along with investigations of relevant attitudinal factors: at the same time however, possible impact on behaviours and uptake rates of interventions should also be considered.

The literature on informed decision-making, as discussed in the previous chapter (see p22), may offer a broad framework for addressing these challenges. The definition of informed decision-making offered by Rimer et al. (2004) as set out on p25 encompasses not only understanding and comprehension of information relevant to the decision, but also consistency with wider beliefs and preferences in terms of behaviour. Knowledge, attitudes and behaviour are the cornerstones of Michie et al.'s (2002; 2003a) multi-dimensional measure of informed choice (MMIC). The authors highlight that previous attempts to define informed choice have focussed exclusively on knowledge, but that knowledge alone does not provide enough reassurance that subsequent choices are fully informed. Accordingly, the MMIC includes also attitudinal and behavioural measures. The purpose of attitudinal measures are provide

an indication of consistency with the decision-makers own values and beliefs; if a decision is made which is clearly at odds with stated attitudes, then this may show that the decision itself may be made on the basis of poor knowledge, or even coercion. Behavioural measures are used as a proxy for actions; in many situations it may be impractical to assess whether the behavioural consequences of the decision are in fact carried out, and so intentions of behaviour are measured instead.

Michie et al.'s (2002) approach with the MMIC is therefore one that incorporates the provision and evaluation of knowledge, along with the use of health psychology theory, to examine the individual's responses to that knowledge. In this thesis a similarly broad approach is used; the provision of knowledge about HPV is the key health promotion action under consideration, with other possible responses being examined as possible by-products of this information provision process. As outlined at the conclusion of Chapter 1 (p45) these examinations would, ideally, be conducted using a randomised control or experimental design.

Previous studies in HPV research as reviewed in Chapter 1 have suggested that fear and anxiety may occur in women as an effect of becoming aware about HPV (see section 1.3.6, p35), and so the following two sections outline two bodies of theory that may be helpful in considering how to examine these responses. Other important responses may be identified over the course of the experimental series however, and these will be addressed in chapter introductions; and a full review of the possible measures and methodologies that could be used to examine these responses is presented in Chapter 3.

2.2. Dual-process theory

Section 2.1.2 highlighted the utility of theoretical approaches that account for relationships between attitudes, and knowledge and cognition in health promotion research. Chapter 1 also covered the emotional responses that have been shown to HPV information (see p35), with negative emotional responses appearing to be most prevalent, though with a number of studies showing more nuanced and contextual responses (such as enthusiasm for vaccination on the part of those parents who considered the prospect of vaccination acceptable and appropriate for their daughters,

as shown by Waller et al., 2006). It is unclear however the extent to which these stated emotional responses translate into measurable responses: do those individuals who state that a piece of information is frightening and shocking in prompted measures of these responses have an objectively measureable affective response? One way to examine this question may be measures of anxiety, as previously examined by McCaffery et al. (2004) and Maissi et al. (2005; see section 1.3.6, p35); another may be implicit measures, the development of which came out of dual-processing theory.

Dual processing theory may be useful in three ways: firstly, it may be able to predict psychological and behavioural responses to negative affect. In examining the impact of HPV information (as set out as a goal for this thesis in the summary of Chapter 1, p45), it would prove useful to predict the associated wider effects that negative affect may have. Secondly, dual processing distinguishes between emotional and rational cognition (as will be further discussed in this chapter), which may provide a means for distinguishing between the negative and more pragmatic responses to HPV information which have previously been shown. Thirdly, dual processing theory has yielded techniques and methods (discussed in full in the following section, p51) which appear to be, in some circumstances, superior predictors of behaviour than equivalent explicit or more conventional measures (see discussion of these findings on p58), therefore providing a possible means of objectively measuring affective responses beyond explicit and self-reported qualitative or quantitative assessments.

Dual-processing theory is concerned with defining and delineating two groups of mental operations, one of which is fast, instinctual, and may be more closely linked with emotions, while the other is slower, and more deliberative and reasoning. As well as delineating the two types, dual processing theory is also concerned with how they interact: neurologist Antonio Damasio (1994) presents the view that feelings and emotional responses play a role in rational decision-making, most notably by providing fast, automatic inputs to instances of decision-making. Damaiso extends this argument by suggesting that emotions and automaticity should, in fact, be considered in any comprehensive theory of human reasoning, because they provide a solution to the issue of intractability. Theories of human reasoning (and therefore decision-making and behaviour) that rely solely upon calculating costs and benefits – that is, which characterise the individual as objectively weighting and weighing all known pros and

cons – such as Subjective Expected Utility theory (Savage, 1954) have been unable to account for the issue of intractability, because under such circumstances even basic decisions would be subject to an ever-increasing number of external considerations. According to Damaiso, and other dual-process researchers, emotions act as regulators or constrictors on the decision-making process and therefore as fundamental influences on cognition and behaviour.

Dual processing theory has been used across a number of domains such as persuasion, social cognition and reasoning research, but there is still considerable variation in terms of views about the underlying processes through which dual processes operate (Evans, 2008). Attempts have been made to identify the common aspects of dual-process models: Stanovich (1999) suggested that it was possible to make generic distinctions between the two modes of processing that were commonly suggested, and termed the two modes *system 1* and *system 2*. Evans (2007), in developing this idea of a generic dual-process model, attempted to set out the common characteristics of these two systems. Evans termed 'system 1' as that which is implicit, unconscious and automatic, and enjoys vast computational resources (in terms of speed of processing and parallel function) that are recruited independently of central working memory. It is therefore able to ground current problems in existing knowledge, experiences and beliefs, and requires little effort to utilise. Evans termed 'system 2', on the other hand, for that which is linked with individual traits such as language and reflective ability, and tends to work in a slower, more explicit and sequential fashion than system 1. System 2 recruits the resources of central working memory (Baddeley, 2001), and can also be linked with measures of general intelligence. It requires a concerted effort to deploy, and can therefore be described as "volitional or controlled," (Evans, 2007) in that it is able to respond to specific instruction and the explicit stated intentions of the individual. In the interest of simplicity, this thesis employs *implicit* to refer to System 1 processes and *explicit* for System 2 processes.

2.2.1. Implicit measures

The recent resurgence of interest in dual-process theory has been largely due to the development of new methodological approaches for measuring implicit processes (de

Houwer, 2006). Implicit measures, as defined by de Houwer, may make it possible to examine whether presented information creates changes in implicit associations that are not revealed by more traditional measures, and these can be compared with more explicit measures which should be subject to strategising and deliberation. They therefore provide a novel approach for studying cancer fear in the present research studies.

The development of implicit measures was motivated in part by their perceived utility in measuring attitudes; if following Eagly and Chaiken's (1993) definition of an attitude as a "psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p1), an implicit method of measuring attitudes would gauge these evaluations in a way that avoids their self-report by the participant. Dual-process theory, as described in the previous section, has a number of implications for the study of attitudes. Explicit attitudes can be equated with the more deliberate and controlled processes covered by the System 2 cluster, and these are the attitudes that are elicited by direct questioning of the type traditionally associated with attitudinal research. With the postulation of those hidden implicit processes covered by the System 1 cluster however, research began to emerge which examined the impact of implicit attitudes on behaviour (as reviewed later in this chapter; see p58), and cases in which explicit, self-reported attitudes differed from implicitly-measured ones.

The methods employed by early implicit-measures research included time-limited decision-making, physiological response measurement and priming (whereby it was assumed that presentation of a certain stimulus would affect responses to subsequent stimuli if the priming stimulus shared characteristics with the latter stimuli), but they proved inadequate in terms of test/retest reliability and inconsistent in terms of how they corresponded with equivalent explicit measures. The development of easily-administered computer-based implicit measures – most notably the implicit association test (IAT; Greenwald et al., 1998), as fully described and discussed later in this chapter, (p55) - have meant, however, that implicit measures have enjoyed a considerable resurgence of use across various fields of research in recent years, and have been considered as potential methods of examining attitudes. Wittenbrink & Schwartz (2007) noted over 100 journal articles relating to the terms *implicit* or *automatic attitude* published in 2002 in an informal search, compared to less than 50 a year two

years prior. A search using the Google Scholar engine for the phase *implicit attitudes* in article titles only returned nearly 300 publications in 2008, and nearly 400 in 2011.

De Houwer (2006) argues that because implicit measures are in their infancy, researchers using them should consider their aims and limitations. Accordingly, Fazio & Olsen (2003) suggest that it is important to understand what it is that differentiates implicit measures from more traditional explicit measures of attitudes: firstly, they are not outwardly presented as a test of attitudes, so that their aims are partially obscured from the participant (and should therefore be harder to provide false responses to). Secondly, participants may or may not have conscious access to the target attitude being studied (Asendorpf et al., 2002). The conscious accessibility of implicit associations is a point of contention in the wider dual-processing literature as well as in critical evaluations of implicit measures; see Monteith et al. (2001) for an example of an implicit measures study in which the participants were mostly able to notice their own performance effects across conditions, and of those who noted this difference a number suggested their own internal prejudices as a possible source of this effect. Gawronski et al. (2006)'s review of studies also assessed individuals' conscious awareness of outcomes on implicit measures, and found no evidence that people lack conscious awareness of indirectly assessed attitudes (although these attitudes may, in some circumstances, influence other outcomes outside of conscious control). (See also Duscherer et al. (2002) for another example of participants showing insight into performance effects, in this case with an affective Simon task.) Therefore the benefit of the use of implicit measures may not be best characterised as a test of exclusively unconscious processes; rather they may provide access to cognitions that a participant cannot or may be unwilling to articulate fluently in a way that is accessible through explicit measures.

2.2.3. Attitudes: implicit and explicit

Returning to Eagly and Chaiken's (1993) definition of an attitude as a "psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (p1), Albarracin et al.'s (2005) acceptance of this definition provides a means by which attitudes can be distinguished from beliefs. While beliefs relate

largely to individuals' confidence in their own objective knowledge, attitudes focus on evaluation. In practice however, some overlap between measures of attitudes and beliefs may be expected.

Assessing attitudes and beliefs has, in the past, been largely achieved via self-report; Nosek et al. (2007) consider this approach to be largely derived from the focus on introspection that was encouraged by the Gestalt paradigm in psychology. Introspection and self-report have persisted long beyond Gestalt perspectives, but are today complemented by a wealth of research on the limits of introspection (Nisbett & Wilson, 1977) and the automaticity of certain aspects of cognition; see for example Bargh's (1997) consideration of automatic processes in everyday behaviour. There has therefore been a great deal of interest in methods of examining attitudes (and wider cognition) that do not rely on self-report or for the individual to have conscious access to their beliefs. Nosek et al. (2002) use the example of assessing an individual's talent for mathematics. Examining this question via explicit self-report means might involve asking "how good are you at maths?" Such an approach leads to a number of potential confounding factors however: does the individual think that they are better at maths than they really are? Is their classification of 'good' the same as that of the experimenter? Does the individual wish to misrepresent their position and give the impression that they are cleverer than they really are? An alternative approach may be to ask the individual to complete a maths test, from where a more objective measure of performance may be obtained. Implicit measures are intended to apply this principle of objectivity to more abstract attitudes. Rather than asking participants to report their own introspections, implicit measures infer participants' attitudes via performance-based tasks. There are a number of measures which have been designed to assess attitudes implicitly; earlier methods tended to rely upon priming, wherein presentation of certain unattended stimuli would be observed to enhance responses to other stimuli, with these relationships indicating associations between the two stimuli (see Wittenbrink, 2007, for a review of priming measures).

Examples of commonly used current implicit measures are the Implicit Association Test (IAT; Greenwald et al., 1998, full description and discussion to follow in this chapter, p55), the Go/No-go Association task (Nosek & Banaji, 2001), and the Extrinsic Affective Simon Task (EAST; de Houwer, 2003). Closer investigation of many, if not

all, of the implicit measures currently in use reveal however that they are variations on the IAT, often with the superficial mechanics of the task designed to a more specific purpose. For example, the Go/No-go Association task can use response latency as its primary outcome, therefore providing simpler analyses than the IAT, and assess a basic measure of implicit associations using fewer trials than the IAT; but has shown less evidence demonstrating the metrics and reliability of the test.

These characteristics of implicit measures may make them useful in health–related research topics, particularly when those topics are of a potentially sensitive or embarrassing nature. It seems reasonable to suggest that some responses to cancer information may be automatic, with cancer-related information being associated automatically with negative attributes. Furthermore, reported opinions on a cancer and sexual-health related topic may be susceptible to social desirability effects or demand characteristics, and deliberate strategising may play a role in determining responses to affective information. The performance-based character of implicit measures, along with their reputed ability to avoid participant biases and strategising, may avoid such effects when evaluating responses to HPV information, and the functional character of the IAT will be covered in the following section.

2.2.2. The implicit association test: conceptual issues and applications.

The most commonly used implicit measure is the IAT (Greenwald et al., 1998), with this class of measure receiving the most supporting evidence through its uptake by researchers from across a range of disciplines. The original proposal for the creation of the test highlighted the utility of a test of response-time based test of attitudes which did not rely upon physiological measurements, time-limited decision-making or priming (as per earlier methods); and that this test should be sensitive enough to detect variability among a given population. It should be noted that the IAT is not considered a direct measure of implicit attitudes however; as the name suggests, it is a measure of associative strength between concepts. The study of implicit attitudes is related to the study of associations, but it is a wider research goal; as is demonstrated by the range of research that is reviewed in the following sections, interpreting equivalences and differences between implicit and explicit measures of attitudes and associations can be

complex and dependent upon the context of the research. In the current series IAT-type measures are presented as measures of association, with relations to attitudes discussed in reflection. Furthermore, a comprehensive review of the use of the IAT is not presented here, as even dedicated meta-analyses have only examined a sub-group of the various uses of the test due to methodological variations (e.g. Greenwald et al., 2009d): a limited number of studies are presented in this section which illustrate the utility and breadth of the IAT, followed by more specific reviews of the use of the IAT in health-related research and the use of one variant of the test.

Tests of implicit associations have much in common with tasks more traditionally associated with cognitive psychology, in that they examine participants' performances on very specific and rigidly-designed experimental tasks. The goal for the participant in an IAT is to place a number of stimuli into the appropriate higher order category. For example, in an IAT designed to examine implicit associations relating to cola brand choices (the target comparison), a series of pictures may be presented each of which depicts a cola bottle from one of two brands, with the participant being asked to match each with its brand name (using separate response keys for the two brands). These trials are, however, intermixed with others where the participant is asked to perform a second categorisation task, and is asked to categorise a separate set of stimulus items on an evaluative (or valenced) dimension, with no indication provided of which categorisation task a participant will need to carry out until the stimulus has been presented. In this respect the IAT bears some similarities to the classic Stroop task (Stroop, 1992), or any given configuration of a task switching paradigm (see Monsell, 2003, for a review). The dimension used in this second task represents the specific evaluation that the researcher wants to make of the target comparison, although this evaluation may be as simple as 'good' versus 'bad' or 'pleasant' versus 'unpleasant.' The main experimental manipulation in the IAT is how these category labels are paired in a given trial block, with response latencies compared between different configurations of these pairings. For example, if a participant's performance is impaired (indicated by higher response latency or greater production of errors) by having to use the same response key to indicate Brand A and the positive evaluative category, this indicates negative implicit associations with Brand A. Good performance under these conditions, on the other hand, indicates positive associations with Brand A. These trials are compared with others where Brand A shares a response key with the

negative evaluative category, and in these cases impaired performance will indicate positive association.

The IAT has shown several robust effects and findings. Firstly, individuals exhibit stable associations which do not correspond with self-reported attitudes and belief whereas earlier types of implicit measure (such as those derived from priming) had been unable to show such stable associations; Lane et al. (2007) show that this finding has been obtained in 17 studies using an IAT. Secondly, the IAT shows good internal consistency; a limited meta-analysis carried out by Hofman et al. (2005c) showed an average reliability of .79 between different stimulus items within a single IAT block. Thirdly, the IAT shows acceptable test-retest reliability; Lane et al., across 20 studies, showed that reliability ranged from .25 to .69, with a mean reliability of .50. IAT-type tasks have also proven difficult to 'fake' (Steffens, 2004; Banse et al., 2001a).

Validity of the IAT is much more difficult to demonstrate however; the processes underpinning the test are assumed to differ depending not only upon the target constructs under study, but also the specific parameters of the task (as described below). The IAT does not necessarily correlate well with other implicit measures: Bosson et al. (2000) showed no correlations between the IAT and any of four other implicit measures of associations, although crucially none of these other measures showed correlations with one another. Evidence for the IAT's discriminant validity is mixed; Cunningham et al. (2004) measured explicit and implicit prejudice in white Americans to black Americans. This study showed evidence of implicit associations loading onto a conceptually valid construct of implicit prejudice, but in analyses implicit prejudice was shown to be conceptually distinct from explicit prejudice and also right-wing ideology. Mierke and Klauer (2003) however found correlations between conceptually distant IATs (most notably between a flower/insect IAT, and an entirely new formulation of the IAT designed to measure extraversion), suggesting that performance effects may be more determined by the test itself rather than the concepts under study. It has been suggested by Lane et al (2007) however that the more recent scoring algorithms suggested by Greenwald et al. (2003) improve discriminant validity on the IAT by reducing individual variance on the task.

IATs have previously been used in many areas of psychology including health psychology (e.g. Stacy, 1997; Wiers et al., 2002), along with clinical psychology (e.g. Teachman et al., 2001) and consumer marketing (e.g. Karpinski & Steinman, 2006a); and the IAT has been used to examine a range of effects and attitudes within these and other domains. The IAT can expose in-group bias for participants' own versus other nationalities (Greenwald et al, 1998), and own versus others' faiths (Rudman et al. 1999). Racial IATs – for example, black versus white skin colour – have been extensively studied but show more complex effects, with both white and black participants showing implicit preferences for white (Nosek et al., 2002). These effects extend beyond race and religion: in-group preferences can be observed in hetero versus homosexuals (Banse et al., 2001b), vegetarians versus non-vegetarians, and smokers versus non-smokers (Swanson et al., 2001).

Perceptions of in/outgroup characteristics are also reflected in implicit measures: for example, Nosek et al. (2002) showed that associations between *females* and *mathematics* were weaker than associations between *males* and *mathematics*. This relationship between gender and characteristics was also shown in terms of career aspirations (*household* versus *career*) by Gawronski (2002).

Relationships between IAT measures and explicit measures are less clear-cut. Early findings showed poor relationships between implicit and self-report measures (e.g. Greenwald, 1998). More promising data have emerged recently however: Greenwald et al. (2003) implemented an internet-based IAT paradigm on which they collected data from a large sample, where a number of positive findings were obtained including voting choices in North America (implicit preferences for George Bush versus Al Gore showed a positive correlation of .86 with explicit choice). Hofman et al. (2005) carried out a meta-analysis of implicit and explicit self-report measures. Based on a sample of 126 studies, the authors obtained an effect size of .24 in correlations between implicit and explicit measures. Correlations were larger when the implicit measure required less effort by the participant to carry out (for example, implicit measures involving more manual methods, such as pen and paper responses, produced lower correlations) and the conceptual correspondence between the implicit and explicit measures was stronger. Greenwald et al. (2009c) also carried out a meta-analysis of the IAT's general predictive validity for a range of self-report variables in 122 studies. The authors

demonstrated slightly higher predictive validity for behaviour by IAT scores than certain measures of certain equivalent explicit/self-report constructs. Overall predictive validity was higher for self-report measures on behaviour (.361 for explicit measures; .271 for implicit measures) but showed much greater variability in effect size.

Use of the IAT to predict behaviours may therefore depend upon the type of behaviour under consideration, as mixed results can be observed by looking at individual studies. For example, no relationships were shown between implicit preferences for sweets versus apples and subsequent observed behaviour (Karpinski & Hilton, 2001b); this does not comprehensively demonstrate that no association between implicit preferences and food choices exist, however, as a variety of other explicit factors may affect food choice. More encouraging results are obtained when implicit measures are tailored to more specific constructs: a measure of implicit self-esteem was shown to predict participants' later feedback responses to success versus failure feedback (Greenwald & Farnham, 2000). McConnell & Liebold (2001) demonstrated that implicit preferences for whites versus blacks appeared to be associated with rated interactions with a black experimenter. In this study implicit and explicit preferences for whites versus blacks were assessed for all participants: over the course of the study, each then interacted with a white and black experimenter. The white and black experimenter then both provided assessments of their interactions with each participant, and these were supplemented by assessments provided by independent raters (by videotape). Of note in this study was the finding that both implicit and explicit preferences appeared to predict behaviour; others had shown no such association in terms of racial prejudice (e.g. Greenwald et al., 1998) although the authors note that the setup of the study may have served to reduce strategising on the explicit preferences component by presenting this measure at the outset of the testing session.

Hofman et al. (2009) speculate on other potential moderating factors which may determine the ability of implicit measures to predict behaviour in certain circumstances and situations only. These included participants' awareness of their own implicit preferences (Greenwald & Banaji, 1995), and whether an effortful/volitional process of information retrieval from memory occurred during completion of the behaviour task (Wilson et al., 2000). Each of these suggestions emphasises the speed or depth of processing of the explicit response. It is important to note that, as its name suggests,

the key factor that drives the operation of the IAT is strength of association. The test can be linked with higher-order conceptualisations of attitudes and affect, but it is strengths of association between concepts that produces differences in response times between trial blocks. An example of a set of concepts used in a typical IAT is flower/insect for the targets (that is, those concepts that are being examined; another example may be white people/black people) and pleasant/unpleasant for the evaluative categories.

Finally, there are unresolved questions as to whether implicit associations can be reliably modified in the short term. Gawronski and Lebel (2008) demonstrated the creation of new implicit associations by repeatedly pairing stimuli with positive or negatively valenced stimuli. This required repeated training sessions however. Foroni and Mayr's (2005) findings demonstrated another context in which short-term changes in associations may occur; by presenting a short story to participants, the authors were able to increase positive associations with insects and reduce them with flowers. The importance of this study is that implicit associations were modified by a single reading of a scenario, and although participants were aware that this scenario was hypothetical, it wwas sufficient to bring about changes in IAT performance.

In summary, although the IAT has seen intense use since being introduced, the literature reviewed here demonstrates that interpretation of an IAT result is not always straightforward. Furthermore, the design and analysis of the stock IAT itself continues to evolve, and variants of the test have also emerged. As well as issues of general validity and reliability, users of IAT-type measures should also consider more specific previous uses of such tests in terms of the attitudes under study, and in this case uses of implicit measures in health research can be examined.

2.2.3. Implicit measures and health research.

There have already been a small number of uses of the stock IAT in health psychology-related work; however, even across these studies there has been great variation in terms of the purposes for which the test has been used and the health behaviour or condition under examination. The IAT has been used to study associations with high-versus low-

calorie foods, and that implicit preferences for one type of food versus the other correlate with self-reported incidences of past eating behaviour (Maison et al., 2004). Richetin et al. (2007a) also showed that a snacks versus fruits IAT variation (using a single target category) was able to predict subsequent behaviour choice in a study of 399 participants. A similar, though smaller, study by Karpinksi and Hilton (2001) however showed that a stock IAT measure did not predict subsequent observed behaviour in 85 participants. There are various differences between these studies however, perhaps explaining the conflicting findings: Richetin et al.'s study tested a single target IAT (see the following section for a full discussion of this methodology; p64) and employed a larger sample, while Karpinksi and Hilton's study was smaller and used a standard IAT measure. Friese et al.'s (2008) study may have demonstrated why findings testing similar concepts with IAT-type measures may differ however, showing that the emergence of a relationship between implicit and explicit measures may depend on moderating factors. In this case for example a relationship between food choice and an equivalent IAT appeared to be modified by cognitive capacity, providing a potential mechanism for explaining why relationships may emerge in some studies and contents but not others. Implicit measures appear to be susceptible to subtle differences in procedures if these may introduce other moderating factors then, and use of different testing methodologies may be a cause of this.

The IAT was used in a different capacity to examine eating behaviour by Raghunathan et al. (2006), using the task to examine how implicit processes influenced participants' perceptions of 'unhealthy' and 'tasty' foods by way of implicit confirmation biases, whereby participants interpreted ambiguous stimuli in line with possible underlying beliefs. This examination of implicit confirmation biases was an unconventional use of the IAT however; Craeynest et al.'s (2008) application was more straightforward, and demonstrated that implicit attitudes as indexed by a conventional IAT can reveal unexpected effects. Overweight and non-overweight adolescents' performances were compared on an IAT designed to assess overall liking for food (versus, in this case, hobbies), in order to examine whether weight was associated with an implicit liking for unhealthy food. No differences in preferences were shown across the groups, but across the study, all participants (including those who were overweight) in fact showed a preference for healthy foods. This may be taken to demonstrate a case where implicit liking has not translated into behaviour (i.e. although implicit measures show

preferences for healthy foods, this may not have translated into behaviour or real-world choice), but care should be taken in this interpretation, as other factors impact food choice than attitudes (for example, practical barriers, such as availability). An earlier study by Roefs and Jansen (2002) had, however, demonstrated even more clearly that implicit food choices are not necessarily associated with weight; this study focussed on differences between fat content in food types, and had shown that obese participants could be characterised by a relatively more negative implicit attitude toward high fat foods as compared to low fat foods. This is compatible with Craeynest et al.'s findings: whereas that study showed preferences across the board for health foods, this finding showed negative associations for unhealthy foods in obese individuals.

Similar studies have been carried out in relation to associations with alcohol. De Houwer et al. (2004) and Wiers et al. (2002) both showed significantly more negative evaluative associations towards alcoholic beverages in heavy drinkers than non-drinkers. Houben and Wiers (2007) have later shown more positive associations towards alcohol in heavy drinkers however, particularly when the images are personalised to individual participants.

The IAT has also been employed in smoking research. Huijding et al. (2005) showed that both smokers and non-smokers showed negative associations with smoking-related stimuli, but those of smokers were less negative than those of non-smokers. In a second study, the authors attempted to ascertain whether local context (i.e. presence of a smoky environment) could affect implicit associations; local context did not appear to affect either group's performance on the task however. There is a more general value of this finding in showing that implicit associations were not easily modified by local stimuli, at least in the realm of smoking-related associations. Although this was a small study with around 25 participants in each of the smoking and non-smoking groups, the authors also employed an Intrinsic Affective Simon Task. This task, although methodologically different from the IAT, also attempts to measure implicit associations, and similar results were obtained throughout on both tasks.

Sherman et al. (2003) carried out a simpler study of relationships between implicit associations and explicit smoking-related attitudes, but in two studies were unable to show stable implicit associations towards smoking across smokers and non-smokers,

and found no relationships between implicit associations and explicit attitudes. The authors suggested that more complex relationships between implicit associations and explicit smoking-related attitudes may exist; or, at least, that simple relationships did not in terms of those as indexed by the IAT. Though these studies were adequately powered (54 participants in a comparison between smokers and non-smokers; 233 participants in correlational analyses of implicit associations and explicit attitudes), it is difficult to draw implications from non-significant relationships between implicit and explicit measures; such findings in this area are generally taken to suggest that more research is necessary.

Finally, two studies have used the IAT to examine the role of implicit associations as predictors of condom use behaviour, both showing positive findings. These were Czopp et al. (2004) and Marsh et al. (2001), and both attempted to explore the contexts in which implicit processes became stronger predictors of behaviour. The former showed that implicit associations predicted condom use when automatic behavioural processes were dominant, and the latter with casual (but not main) partners. Interpretation of these two studies is complicated by use of a more convoluted procedure in the Marsh et al. study however; whereas Czopp et al. employed a direct implicit measure of evaluative associations with condoms as compared to a neutral category object (in this case trees). Marsh et al. employed an attitude self-identity IAT which tested associations between condoms and concepts of the self. Taken together however, these findings, similar to other studies in health research that have employed the IAT, demonstrate that relationships between implicit and explicit measures can be strengthened by moderating factors, with relationships only emerging in certain subgroups.

The studies reviewed here demonstrate the diverse uses of implicit measures in health research, although they are most commonly used to examine concepts that loosely approximate target behaviour: for example, healthy and unhealthy foods to represent eating habits, and condoms to represent protective sexual-health related behaviours. In these cases researchers are examining the role of automatic responses and associations in health-related behaviour, and while there is as yet little evidence to suggest causation or direction-of-effect in these associations, research continues in this field. It may be noted however that the more general findings in IAT research (such as many of those

discussed in the previous section; see from p55) usually examine more abstract concepts: e.g. race and ethnicity. The present experimental series aims to use an implicit measure to evaluate fear associations relating to cancer, without the obvious behavioural analogue of many of the other studies reviewed in this section.

2.2.4. The single-category IAT methodology.

The standard IAT as set out by Greenwald et al. (1998) is designed to measure associations between a two-category target dimension and a two-category evaluative dimension (for example, flower/insect and pleasant/unpleasant); however there may be cases where a researcher's aim is to measure positive and negative evaluations of a single target category. The single-category IAT (SC-IAT; Karpinski & Steinman, 2006c) can examine associations between a one-category target (in this case 'cancer') and an appropriate two-category evaluative dimension (e.g. pleasant/unpleasant). In Chapter 1, one of the key aspects of HPV information appeared to be the link between HPV and cancer, and it may therefore be that implicit cancer associations would provide an objective index of responses to HPV information; can exposure to cancer-relevant information– in this case HPV information – bring about changes in cancer-related implicit associations? Rather than eliciting preferences for one target category over another, the SC-IAT generates a single evaluation value - positive or negative – towards one target category, and eliminates the need to elicit comparative implicit associations with an alternative category. (It should be noted that Bluemke and Friesse, 2008, have recently introduced a conceptually similar paradigm termed the single-target IAT which employs different presentation timings and response windows.)

A limited number of studies have employed the SC-IAT to various purposes since its introduction, and a subset of these have examined health-related attitudes across alcohol, food consumption and exercise behaviours. Houben, Nosek and Wiers (2009) compared conventional and single-category IAT variants in examining implicit alcohol associations as predictors of drinking behaviour. Both types of IAT predicted drinking behaviour here, but there was some evidence here that the bipolar IAT showed a greater amount of internal consistency than the uni-polar SC-IAT. Two other uses of the SC-IAT in alcohol consumption research employed more unconventional designs:

following those uses of the conventional bipolar IAT to examine alcohol-related associations (as discussed on p62), Friese et al. (2010) took a novel approach in examining implicit associations as predictors of not behaviour, but attention-related cues in the processing of alcohol-related stimuli.

Studies have also examined eating behaviours and the SC-IAT. Hofmann et al. (2010) examined the strengths of automatic associations with unhealthy snacks, comparing performance in those instructed to form restraint intentions about the snack with controls. Implicit associations as indexed by the SC-IAT with the snack were more negative in those instructed to avoid it. Hofmann & Friese (2008), again examining restraint intentions in eating choices, showed that the power of implicit associations to predict food choices was enhanced by prior consumption of alcohol, suggesting that the SC-IAT was able to predict preferences that are usually overruled by normal inhibitory processes. Nederkoorn et al. (2010) have also examined the relationship between response inhibition and implicit associations in eating behaviours as indexed by the SC-IAT, demonstrating that those individuals with strong implicit preferences for unhealthy foods and low inhibitory capacity were those who put on the most weight over the study period.

Finally, Conroy et al. (2010), in a study of 201 adults, used the SC-IAT to compare implicit attitudes on physical activity with equivalent explicit measures, and also an objective measurement of physical activity (as measured via use of a pedometer); here, the SC-IAT appeared to be able to predict behaviours, although not necessarily explicit measures in this case. While the authors did not explore whether explicit or implicit measures proved superior predictors of behaviour in detail, it is notable that implicit associations and explicit attitudes did not appear to show the same pattern of responses.

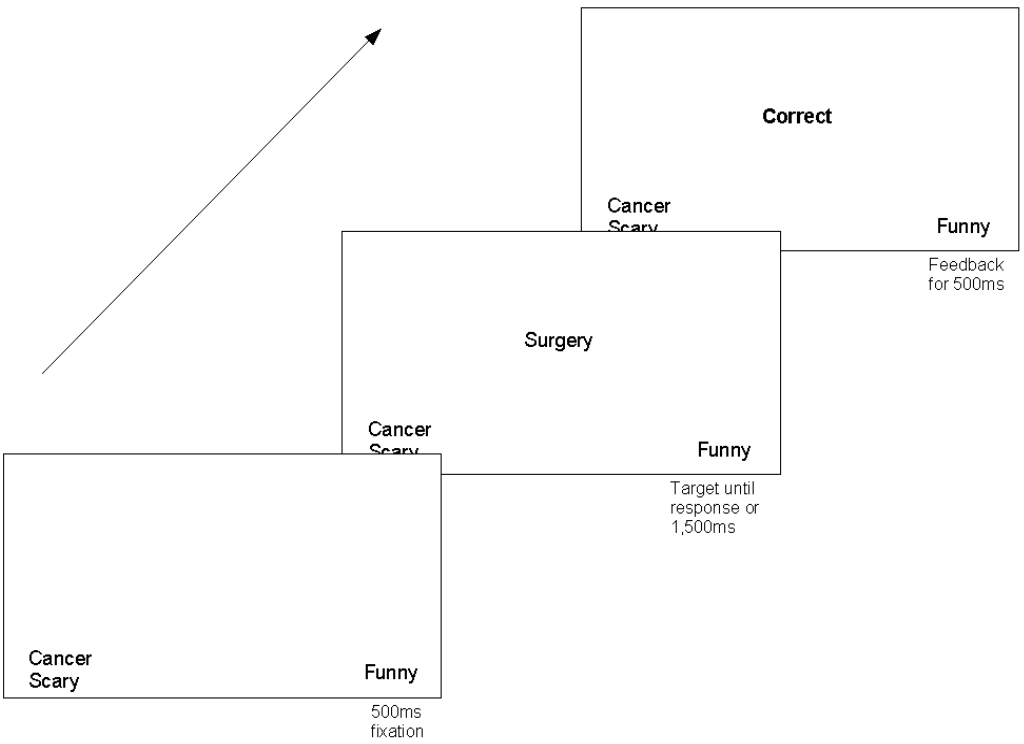
Taken together, these studies suggest that the SC-IAT can be employed in similar application as the standard IAT in health research, though there are indications that internal consistency may be lower in the single category variant of the test compared to the standard IAT. However, in the case of the current studies this loss of consistency is traded for the single-category property of the task; only a single category (that of *cancer*) is of interest here in terms of eliciting evaluative associations, and introducing

an alternative null category when none is obvious would unnecessarily complicate the design of the task.

2.2.4.1. Implementation of the SC-IAT.

In the studies presented in this thesis, the SC-IAT was conceptualised as a measure of implicit cancer fear, and this is a novel application of the test. Evaluative categories were devised to reflect this purpose: the negative evaluative category was therefore *scary*. The opposing positive evaluative category was more open to suggestion: should this represent a neutral choice (for example, *not-scary*) or a more outwardly positive concept? With no existing evidence as guidance here, the latter option was chosen because it would likely lead to more polarised results in this initial use of the paradigm: therefore a category was selected which represented a fundamentally different concept with a similar word-length and familiarity index rating, which was *funny*. (Chapters 7 and 8 include a modification to and a full assessment of the implications of this methodological decision, however; see p218.) Karpinski and Steinman's methodology (Karpinski & Steinman, 2006) was used, where participants complete 192 experimental trials over the course of 4 trial blocks (henceforth referred to as a single task). Within a single SC-IAT trial, there are three stages, as shown in Figure 1 (p67): these are the fixation period (500ms), the presentation of the target stimulus (1500ms or until a user response is detected) and the feedback period (500ms) where the user is told whether their response was correct or incorrect.

Figure 1. Representation of a typical congruent trial used in the SC-IAT.



Frames demonstrate screen output during the SC-IAT. Labels at the bottom of the frame correspond with response keys *Z* and *M*. Stimuli (i.e*surgery*) and feedback (i.e. *correct*) appear in the centre of the screen.

Scoring an IAT-type task can be achieved via a number of different approaches, and in this thesis outcomes are reported using three methods. The advantage of presenting a number of outcome variables is that each has its own strengths and drawbacks. A *d score* measure is obtained by calculating the difference between target-positive and target-negative trial, in a method that was adapted by Karpinski & Steinman from the algorithm used by Greenwald, Nosek & Banaji (2003); the test's creators suggest that this is the 'gold standard' in terms of reporting outcomes. This compound score approach is usually referred to an IAT score, and is the primary method used in this thesis. Each participant generated a single value indicating their implicit associations at a given time point using this measure. Responses shorter than 350msec were excluded from analysis and those above 1500msec were classed as incorrect and awarded a penalty value (as were incorrect answers). The use of penalty value system for incorrect answers ensures that the IAT measure also reflects accuracy, as well as speed,

of responses. The general rationale for the compound score is that higher reaction times when the target category is placed on the same key as the negative items indicates implicit positive associations with the target category, because higher response times suggest that the target category is difficult to pair with negative concepts. Accordingly, higher reaction times when the target category is placed on the same key as the positive items indicates implicit negative associations with the target category because higher response times here suggest that the target category is difficult to pair with positive concepts. Target-positive reaction times are subtracted from the target-negative reaction times (reflecting negative associations subtracted from positive associations). This value is then divided by the standard deviation of the overall trial block. Therefore the IAT score measure can be positive or negative, reflecting stronger associations with either the positive or negative evaluative categories, and the further the distance of the value from zero, the stronger that association is suggested to be.

The *d score* measure does not permit comparisons between target-positive and target-negative trials in a single IAT however. Simpler measures are less commonly used but provide a useful supplement to the aforementioned composite score by presenting a less treated version of the data. The other measures used presented separate values for those trials which diagnose positive association with the target category and those which diagnose negative association. The first of these separable measures was derived from accuracy, and compared the number of correct category judgments with the number of incorrect judgments. Higher scores on this measure indicated better performance. The second, like the compound IAT score, was based on reaction time, and was again adjusted according to the guidelines on use of the SC-IAT (involving cut-off values and penalty scores). This measure is based on response latency, and so low scores here suggested faster (and therefore better) performance. Analyses were conducted for accuracy and reaction times of correctly judged trials for both ‘congruent’ and ‘incongruent’ trials throughout.

2.2.5. Implicit measures and dual processing: summary.

It was hoped that use of an implicit measure in this thesis may provide a method of understanding the seemingly disparate responses to HPV information reported in previous research, possibly reflecting a disparity between immediate and strategised psychological reactions, with negative emotional responses experienced on an automatic or immediate basis. This is in line with a neurocognitive approach, which has shown that emotional stimuli receive enhanced cognitive processing in both humans (Bradley et al., 1992; Gallagher & Chiba, 1996) and animals (Cahill & McGaugh, 1998). Furthermore, to return to the view presented by Damaiso (1994), automatic, implicit processes may have a wider impact on a range of psychological and behavioural responses by acting as regulators on decision-making; the initial studies in the present experimental series assessed whether general negative affect could occur as a response to health-related material, and whether this may impact responses as assessed by more conventional measures. An even more straightforward benefit of implicit measures is that they may make it possible to examine whether presented information creates changes in implicit associations that are not revealed by more traditional measures, and these can be compared with more explicit measures which should be subject to strategising and deliberation.

As was suggested by the general dual process theories discussed earlier in this chapter however, implicit and explicit processes work in parallel as determinants of behaviour (see discussion, p49); it is still therefore necessary to consider more deliberate responses to fear or threat content, and these are covered in the following section on fear appeals and persuasive communications.

2.3. Introduction to theories of fear appeals and persuasive communications.

Fromm the literature discussed in Chapter 1, one theme that emerged was the need for high uptake of an HPV vaccine in order to ensure cost-effectiveness in a vaccination programme. Another theme was the need to balance these concerns against maintaining personal autonomy in individuals and informed consent. A separate body of literature has however examined the psychological effects of information provision in relation to health behaviour which, given that one of the goals of HPV information is promote vaccination, may prove useful here. The term ‘persuasive communication’ was

introduced by Hovland, Janis and Kelly (1953) to refer to information designed with the explicit intention of bringing about behaviour change in message recipients. The authors suggested that inducing fear in message recipients was important tool in the design of an effective persuasive communication, and out of this developed a body of research and theory into the processes underlying fear appeals, including Leventhal's parallel process model (1971), Hovland, Janis & Kelly's (1953) fear-as acquired-drive theory, and Witte's (1992) extended parallel processing model. Ahead of an in-depth discussion of the latter theory however, it is important to establish a working distinction between an instance of information provision and a persuasive communication. Information provision relates to those issues discussed in section 1.3.7 on informed consent (p22) whereby individuals are provided with enough knowledge to meet ethical guidelines; the goal in informed consent is not behaviour change. In contrast, in a persuasive communication the desired outcome is to change an individual's behaviour in a way that is broadly assumed to be positive to their health.

Modern research in persuasive communications and fear appeals has developed from those earlier theories of which the primary purpose was to persuade regardless of informed consent. Instead, more recent theory attempts to model the processes by which individuals make decisions where threat and protective or remedial actions are involved: e.g. where disease represents a threat, and taking of medicine the appropriate remedial action. Use of fear appeals theory in the present experimental series therefore attempts to understand individuals' responses to HPV, cervical cancer and HPV vaccination in these terms, with a view to better categorising those diverse responses to HPV information suggested by past evidence reviewed in Chapter 1 (see from p35). Witte's (2002) extended parallel processing model provides an approach that encompasses explicit perceived threat, explicit perceived efficacy of the recommended response, and also affective fear responses.

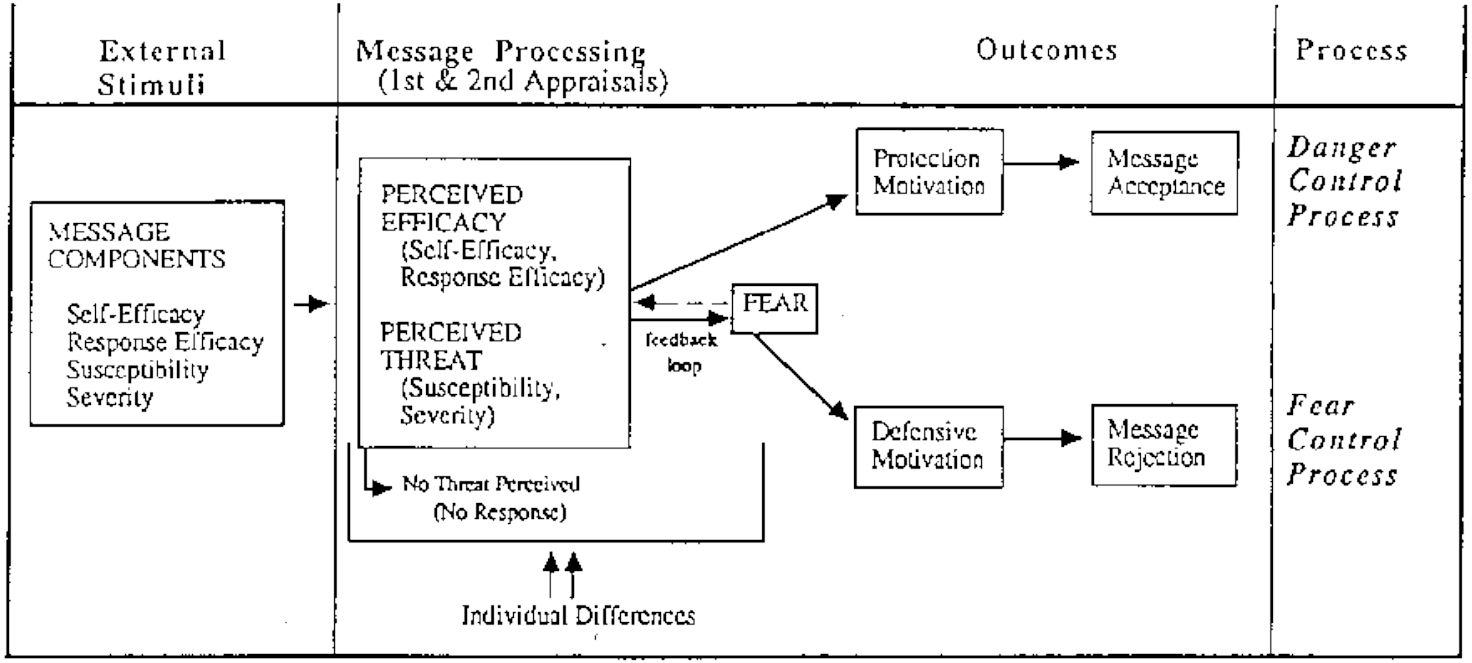
2.3.1. The extended parallel process model

The extended parallel process model (EPPM; Witte, 1998) is the most recent and perhaps the most comprehensive account of responses to fear appeals available; see

Figure 2 (p72) for a visual representation of this model. Because the EPPM represents an attempt to build a comprehensive model of responses to fear appeals by integrating key principles from earlier models, only this model is described in depth. With Leventhal's (1971) parallel process approach as a conceptual base, the model specifies that both emotional and deliberate processes may influence psychological responses through 'fear control' and 'danger control' processes respectively. Like the parallel process model, Witte characterises danger control processes as 'cognitive' and strategic, while fear control processes are more emotionally-driven coping responses (such as defensive avoidance, denial, and message reactance). Witte (1998) also moves further away from the view that fear control responses are maladaptive and danger control responses adaptive, stating that a fear control response might well be considered adaptive when threat is unavoidable. The EPPM also incorporates aspects of another approach to fear appeals, which is Rogers' Protection-Motivation Theory (PMT; 1975; 1983), most notably by including a variable of protection-motivation which drives the individual to seek out new behaviours to counter threats. Protection motivation in both the EPPM and PMT is an intervening psychological variable which works to protect the self from danger by initiating, sustaining and directing relevant activity, although while in the PMT it is the most important determinant of behaviour, the EPPM relegates it to a determinant of message acceptance only.

An individual's progression though the EPPM can be visualised as a flowchart, where they pass through two separate appraisals of the message, but drop out of the process (and therefore become ineligible for behaviour change to occur) if certain conditions are not met at key stages. Initially, the message is assessed in terms of its threat content, and similar to earlier theories, this can be assessed via two measures; these are the severity of the threat, and the individual's perceived personal susceptibility to that threat. The threat variable is obtained by adding these two measures. The rationale behind this first appraisal is that a certain level of threat is necessary to permit further progress through the model. To employ the flowchart metaphor once more, individuals who do not perceive a certain threshold of threat in a fear appeal will 'exit' the model, and commit no further cognitive resources to the message. In other words, if a threat threshold is not reached, the message will simply be ignored and attitudinal or behavioural change will not have the opportunity to occur.

Figure 2. The Extended Parallel Processing Model.



(Witte & Allen, 2000)

If the threat threshold is reached, then individuals will enter into secondary appraisal of the message where, because they believe themselves to be at significant risk of a significantly unpleasant threat, they will seek to consider possible remedial or preventative actions. Secondary appraisal considers the efficacy of the recommended response, and like threat appraisal, is composed of two additive variables: response efficacy (that is, the belief that the action is effective in preventing the threat) and self-efficacy (the belief that the individual is, themselves, able to carry out the recommended action).

According to the EPPM, these two variables of perceived threat and efficacy will determine the individual's psychological (and subsequently behavioural) response to a fear appeal. One of the main distinctions of the EPPM from Rogers' PMT (as discussed briefly on p71), is located at this stage of the model. Fear in the EPPM plays a key role in determining the individual's perception of threat, specifically by providing a feedback loop during appraisals: high threat content may make an individual experience fear, which, in turn, affects perceptions of threat (the implication, then, is that 'emotional' fear can influence or produce biases on perceived severity and/or susceptibility). Emotional fear, then, may be instrumental in determining whether the initial 'threshold' is reached for the secondary appraisal to take place; fear acts as a catalyst for action via the feedback loop.

Whether the individual falls into a danger or fear control state is determined by the overall balance between threat and efficacy. In practice, by looking at whether an individual's estimations of threat exceed their estimations of the efficacy of the recommended response (or vice versa), it can be estimated via a final critical value whether that individual is likely to go into a danger control state or a fear control state. One way of characterising this distinction in plain terms may be as a 'flight or fight' reaction; a general principle which determines whether the individual seeks to avoid a posed challenge or to meet it.

The EPPM uses this simple formula to predict outcomes to fear appeals in practice, but it should be noted that it only approximates the idea of the two stages of appraisal noted earlier. Witte's methodological implementation of the EPPM is a purpose-built instrument tailored to the target threat and remedial action and this instrument is

described in full in the following section (p75). However, in practice the individual is simply pulled in two directions at once: firstly, emotional fear is linked directly to perceived threat, and the strength of these interlinked variables in response to a fear appeal determines the capacity of the message to pull the individual into a state of fear control (that is, a negative critical value). Secondly, the perceived efficacy of the message allows individuals to generate danger control responses (by facilitating a positive critical value) which are usually associated with uptake of the recommended remedial response.

The EPPM also specifies an indirect role for individual differences in determining reactions to fear appeals; Witte (1998) suggests that factors such as prior experience and trait variables (including, but not limited to, anxiety and locus of control) do not directly influence outcome variables such as defensive avoidance, reactance, attitudes, intentions or behaviours; instead, individual differences act as moderators influencing perceived threat and efficacy.

There are also some conceptual similarities between the EPPM and Leventhal et al.'s (1997) self-regulatory model (which describes how individuals with illnesses or conditions seek to return to a state of 'normal' health). The latter specifies that a key factor in the uptake of health behaviours is the individual's realisation of a link between the target behaviours and condition or problem; the individual will only employ a certain behaviour or action as a method of returning to good health if it fits with their own understanding of the causes of the illness or condition. Hall, Weinman and Marteau (2004) for example showed that perceived coherence of an information source about the link between smoking and cervical cancer in women moderated a relationship between perceived vulnerability and intentions to take part in protective behaviours. The EPPM, it could be said, also attempts to account for effects of perceived coherence and understanding, although perhaps more coarsely; the EPPM's efficacy variable assesses the individual's perception of whether the target action will prevent or remedy the target problem.

2.3.2. The Risk behaviour diagnosis scale.

The risk behaviour diagnosis scale (RBDS; Witte, 1996) is the main methological tool of the EPPM designed to assess the variables that are crucial to the model. The RBDS is split into a number of subscales: threat is assessed via subcomponents of susceptibility (e.g. "I am at risk for getting breast cancer") and severity (e.g. "I believe that breast cancer is extremely harmful") of the target condition. Efficacy is assessed via subcomponents of response efficacy (e.g. "Breast screening works in the prevention of breast cancer") and self-efficacy (e.g. "I can easily attend screening to prevent breast cancer"). The variables of threat and efficacy are then used in additive combination to produce a final critical value; if this value is positive, the model predicts that the individual will be in a state of danger control and will seek to act on whatever remedial response is suggested. If negative, the individual will fall into a fear control state and seek to reduce their emotional response by whatever means possible (not necessarily adoption of the suggested remedial actions). Threat and efficacy are not predicted to interact in the EPPM, although Witte does suggest that in order for a remedial response to occur a certain threshold of danger control must be reached. This threshold is not formally specified in the EPPM however.

In practice the RBDS constitutes a series of statements to which the participant agrees or disagrees with on a likert scale for each. The instrument has been designed to be adaptable to assess responses to various target conditions and appropriate remedial or preventative actions by substitution of key terms in each statement; over the course of this study, three different adapted versions of the scale were developed to correspond with three different threats and associated remedial actions. These adapted versions are shown in Appendix 12 (p357), and in the current experimental series the three threat conditions were HPV and cervical cancer, breast cancer, and environmental. Witte et al. (1996) reported reliability estimations of above .70 for the severity, susceptibility, self-efficacy and response efficacy subscales of the RBDS; Gore and Bracken (2005) also used a version of the RBDS tailored for use with meningitis, and again obtained adequate reliability estimates: for severity, .91; for susceptibility, .85; for response efficacy, .87; for self efficacy, .95.

2.3.3. Applications of the EPPM.

A model with clear predictions such as the EPPM has many potential applications in research, but there are only a limited number of studies which use the RBDS and/or calculate danger/fear control states as primary outcomes. Jones for example (2004) obtained a set of results examining intentions to attend mammography screening which emphasised the value of communicating efficacy information over threat information. Respondents high in efficacy were relatively immune to changes in threat level, supporting the pathway suggested by the EPPM. The results also found however that higher threat levels invoked stronger negative emotional and behavioural responses in women with low response efficacy. The authors suggested that care should be taken when using threat in untargeted interventions; it may be appropriate to use threat with those groups at risk of the target condition because the benefits of obtaining positive behavioural outcomes may be an acceptable trade for some amount of negative affect (although a superior strategy would be to target those with high response efficacy who may be immune to these negative effects). This article introduces the idea of balancing possible positive impacts on desirable health behaviours with inducing negative affect outside of the core demographic targeted, and this is supported by Witte (2008) who conducted a survey of 86 US women of mammography-attendance age and who had never been screened before. This study also demonstrated the independence of efficacy and threat perceptions, but also introduced a variable of fear as a separate and independent determinant of behaviour from efficacy and threat.

Lavela, Smith & Weaver (2007b) used an EPPM-guided approach to study influenza vaccination in injured veterans (n = 968; an at-risk population), with the key finding that those in a fear control state were more likely to report past infection with influenza. The model proved a good fit for the data, and made an interesting finding with respect to respondents with zero point critical values (that is, who were in neither danger nor fear control states); these individuals were the most likely to not have had a doctor or nurse recommend them a vaccination in the past, with the authors suggesting that these individuals may characterise a group who had not engaged with the issue of vaccination. The authors recommend a tailored strategy of high threat and high

efficacy for these individuals. Considered in conjunction with the results of Jones (2004), these findings are perhaps indicative of the importance of the base subject matter when comparing across fear appeals; whereas the cancer-focussed study included a comparison of high and low threat conditions, it may be argued that both were significantly more threatening than the subject matter of influenza as per the Lavela, Smith and Weaver (2007) study. It seems reasonable to suggest that there may be a threshold for threatening content that both conditions in the cancer-focussed study met on the sole basis of the subject matter employed.

Keeping with influenza behaviour, but applying the model's concepts to a different purpose and population, the EPPM was again used with respect to local public health authority responses to influenza pandemic by Barnett et al. (2009). This study is particularly interesting to compare with the other studies mentioned in this section because it assesses willingness to deploy resources for the health of others rather than the respondent's own health. An online survey (a modified version of the RBDS) was administered to 1835 local public health employees in the US, and it was observed that respondents with low efficacy perceptions of the held resources were reluctant to deploy them regardless of severity; the recommended intervention suggested by the authors was that in order to better prepare for pandemics, health providers should be educated on the efficacy of the treatments used. Roberto and Goodall (2009) conducted a similar study into 151 US physicians' intentions to use test patients' levels of kidney function, although here the key determinant of behaviour was threat perception rather than efficacy. Clearly, and in line with the model, the contributions of threat and efficacy are dependent upon the specifics of the decision-making context.

Smith et al. (2008) applied the EPPM to an alternative kind of health threat and remedial recommendation: hearing loss and appropriate protection in farmers and landscape workers. In this study, a print evaluation was designed according to the principles of the EPPM, by attempting to communicate the threat potential of hearing loss and the efficacy of protection in preventing against negative effects. A thorough and effective design was employed, examining EPPM variables both before and after presentation of the leaflet, showing that efficacy and threat perceptions were generally high throughout even at the onset of testing, with presentation of the print intervention associated with a small but significant boost to each of these variables and behavioural

intentions. Another diverse use of the model is shown by Allaverdipour (2009) , who used the EPPM to assess determinants of behavioural factors for drug abuse in 176 Irani adolescents. The compound variables of the RBDS were shown to be less successful at predicting drug use behaviours than the individual components of perceived severity and self-efficacy, and the authors included an additional variable of self control which also contributed to more accurate prediction of behaviour (although it is not specified how this variable differs from self-efficacy).

The EPPM has also been used in qualitative contexts: Cameron et al. (2009) used the EPPM in guiding thematic analysis in focus groups with 48 African-American seniors, with the goal of designing improved messages for encouraging influenza vaccination. Here responses were organised into categories of threat, severity, efficacy and self-efficacy. Findings were used to guide further quantitative research and suggest recommendations for message design with this group: most notably, improving communicated efficacy. Noar (2009) organised a 10-year retrospective review of research into mass-media health campaigns by the concepts set out by the EPPM, finding that tailoring campaigns to use appropriate levels of threat and efficacy communication is an essential factor in ensuring that mass media campaigns have their intended effects. Similarly, Choi and Lin (2008), in examining media coverage of natural disasters, used an informal reading of the EPPM to categorise content into one of a number of types of communication, and observed that even in newspaper coverage, communication of the efficacy of protective actions (i.e. reinforcement of homes against storm damage) was the most commonly used message.

The range of studies reviewed here demonstrates the various threat conditions (and associated remedies) that the EPPM can be used to assess, through modification of the RBDS. There are also notable differences in the methodologies and analyses used across these studies, with some employing the compound variables of the EPPM as predictors of behaviour, in some cases splitting respondents into those who enter danger versus fear control states and observing differences between these two groups; e.g. Lavela, Smith & Weaver (2007a) . Others such as Smith et al. (2008) considered the individual impact of threat and efficacy perceptions on behavioural outcomes, and others still used the variables suggested by the EPPM to more diverse purposes (such as Cameron et al.'s 2009 study). Most of the studies reviewed, however, have considered

the role of the EPPM's variables as both outcomes and predictors of other behaviours (such as behaviour).

2.3.4. The EPPM and wider theoretical concerns.

The EPPM shares the non-monotonic principle of fear appeals with earlier models; that is, that a certain amount of negative affect on the part of the recipient is essential in mobilising health protective behaviour. Too much negative affect, however, and the recipient will avoid processing of the message. One aspect of the EPPM that warrants closer attention is the distinction between threat and fear however. Although it is claimed that the two interact heavily and quickly with one another, they are nonetheless viewed as separable concepts. In terms of the model's stated mechanisms, fear mostly influences fear control processes (which are more closely linked with emotion) and cognitions about threat and efficacy influence danger control processes. (Note, again, the distinction between process types in terms of the amount of 'cognition' involved.)

As Witte (1998) notes however, one problem with verifying this aspect of the model is in terms of measurement. Assessing emotion using self-report is a less-than-optimal solution for a number of reasons, including reporting biases, and, more worryingly, the possibility that an adequately-accurate perception of one's own emotional processes simply may not be available under some circumstances.

2.4. Summary

This chapter has covered three related topics: firstly, following the health provision and promotion challenges set out in Chapter 1, the need for research examining a broad range of psychological responses to health information (p47). Two areas of theory were then identified, both of which were associated with practical measures and methods: these were dual-processing theory (p49; and the associated tools of the IAT, p55, and the SC-IAT, p64) and the EPPM (p70; and the associated tool, the RBDS, p75). The aim of introducing these theories and methods was to improve the ways in which emotional responses are measured in examining responses to health information: dual-

processing methods by circumventing explicit responses, and the EPPM by using explicit measures which are designed to provide a specific account of the impact of fear content in health information. Dual-process theory highlights the importance of affective responses by aligning them with automatic or implicit processes, which, in turn, impact upon a wide range of psychological and behavioural responses. Whether general negative affect is observed in a range of measures in response to HPV information was examined in the first study of this experimental series. Later studies examined the role of implicit processes more directly, and compared these with explicit perceptions of threat and efficacy as defined by the EPPM.

Design and implementation of a paradigm to study a broad range of responses to health information must consider the use of a wider range of measures at this early stage however. The purpose of the following chapter was to review previous attempts to study responses to health information, and ascertain which other measures, techniques and methods should be used alongside implicit and fear measures. On the basis of the evidence and literature presented so far, four classes of measure appear to be important. Based on the studies reviewed in Chapter 1, behaviour and knowledge should be integral when assessing responses to health information. The theory reviewed in this chapter has emphasised the importance of attitudes, both implicit and explicit, and affective responses however. The following review chapter is informed by these considerations.

3. Evaluating cancer and STI-related health promotions in print: a review of measures

3.1. Introduction and objective

At the outset of Chapter 2 a discussion of the perceived needs of health promotion research in the context of HPV information provision was presented (p47). Previous research in informed consent and decision-making (as discussed on p22 and p48; most specifically that of Michie et al., 2003) provided a framework for exploring received knowledge and informed consent to expand upon. The aim of this review was to identify a wider range of measures that may be employed to examine the wider issue of psychological responses to health information (including, but not limited to, knowledge and affect). Possible settings and populations in which to conduct the research were also considered.

It was concluded from the previous chapters that in order to make confident assessments of the impact of HPV information ahead of the introduction of the UK vaccination programme, an experimental design should be used that considers a range of measures spanning at least four categories of measure. These are knowledge, attitudes, behaviour and affect. Given that the focus of this thesis is information provision, a measure of knowledge can be used to ensure that the information has been remembered by the participant; the guidelines on informed consent reviewed in Chapter 1 however (e.g. General Medical Council, 2008; see p22) specify that the knowledge of the information recipient should be checked or evaluated. Attitudes and beliefs are also specified by Michie et al.'s (2003) multi-dimensional measure of informed consent as essential to informed decision-making and consent, as any decision-made should be in line with these measures. Affect was highlighted as an important response to consider by the literature review of responses to HPV information in Chapter 1 (see p35), and expanded on in the considerations of dual-process theory (e.g. Evans, 2003; p49 onwards) and the extended parallel process model of fear appeals (Witte, 2000; p70 onwards).

This review chapter examined studies from across a range of research applications to ascertain how previous work has assessed knowledge, attitudes and affect in evaluating information sources in terms of selection of measures and research methods. A secondary goal is to identify other types of measure that were not considered in the introductory chapters. Even in cases where such an approach has not been explicitly set out by the researchers, it is likely that existing studies that evaluate health interventions or health education materials will employ measures which can be used to address these concerns. A full systematic review (as defined by the guidelines set out by Cooper, 1989) was not presented here for two reasons: firstly, the range of outcomes under consideration was too diverse to draw specific conclusions about causal effects; indeed, examining a wide range of outcome variables for possible use is a primary aim. This would make use of meta-analysis especially difficult given that a single central tendency (as defined by Rosenthal, 1991) cannot be identified. Secondly, each of the studies examined utilised different interventions and displayed different effects upon the various outcomes. DeCoster (2004) specifies that one set of circumstances where a full systematic analysis or meta-analysis is unsuitable is when qualitative differences between studies are under consideration, and given that the goal here is to elicit possible new categories of measures beyond those generated by the earlier literature reviews and a range of methodologies, a full systematic methodology was not used. However, Cochrane guidelines were used to identify studies for review in terms of generation of search terms and inclusion/exclusion criteria (Higgins and Green, 2009). In order to determine an appropriate sample size for the current studies along with determining appropriate handling of control groups and materials, a number of basic quality criteria were also assessed. The scope of the review was limited to print information interventions, as this was the medium that was to be used in the current experimental series.

3.2. Methods

3.2.1. Data Sources

The following databases were searched for relevant articles: PSYCHinfo, ISI Web of Science (including the Social Sciences Citation Index), and Pubmed/MEDLINE. Potential abstracts and titles were entered into a database using the Reference Manager software (Thomson Reuters, 2006) where duplicates were flagged and removed. Following this stage, relevant authors and journals were identified and hand and electronically searched (for example, by running 'related articles' and 'cited by' searches on the aforementioned electronic databases) to ensure that no relevant articles were missed.

3.2.2. Identification of relevant articles

A list of to-be-reviewed articles was generated by a three stage process: creation of an extensive list using keywords and search methods, application of inclusion criteria to the list (based on reading of abstracts only), and finally application of exclusion criteria based on reading of the full articles.

3.2.2.1. Keyword generation and search terms

Searches were not limited by year of publication. Primary keywords reflected the basic research topic - that is, methods of evaluating print-based materials and interventions – and are summarised in Table 1 (p84). These were relatively domain non-specific; that is, not limited to a single area of application such as cancer screening. While 'print' was the primary term used in searches, another less extensive round of searches was run with the term 'cancer' to retrieve records which did not explicitly mention print material. Secondary terms were used alongside the primary search terms and ensured that the study related to either sexually transmitted infections, perceived risk, or merely use of an intervention (Table 1 shows the combinations that were used). These were

chosen following group discussions, and finalised via examination of accepted MeSH keywords. Use of these search terms (along with the reverse-search methods described in section 3.2.1.) generated an initial list of 1004 abstracts.

Table 1. Search terms.

Primary search term	Secondary search term
print*	Intervention$
	sex* AND transmitted
	sex* AND transmission
	STI
	STD
	perceived AND risk$
cancer	perceived AND risk$
	viral AND intervention$

3.2.2.2. Inclusion criteria

Inclusion criteria were used to ensure that the studies examined reflected the aims of the review. One of the aims set out in the introductory chapters was to use experimental methods: an inclusion criteria then was that the articles reviewed were concerned with evaluating psychological responses produced by recipients of information materials using an experimental design with a quantitative component.

The current experimental series was structured around assessing printed health materials. Accordingly, only studies comparing at least one print-based method of information provision were therefore included for review in this chapter, though this needed not be the study's primary stated focus; indeed, in some cases print-based materials were used as controls against other intervention types. A final limiting criterion was used to ensure that the studies reviewed relate specifically to the theme of the current research: i.e. only to responses to information about cancers or STIs (and relevant behaviour change). This was both to maintain manageability of the review's scope, but also because they were those studies proved the most likely to generate

appropriate measures and methods given that they were concerned with presentation of potentially affect-inducing information materials.

In summary, the following criteria were used to identify 70 relevant articles from the list of 1004 abstracts:
a) the article was concerned with producing and evaluating changes in knowledge, attitudes, affect or behaviour in response to the presentation of information materials using an experimental design.
b) the study used at least one control group, and at least one level of the manipulation variable with a print-format information material (this print-based condition did need not necessarily be the experimental group; in some cases print-format interventions were used as controls for alternative-format interventions).
c) the intervention being used was concerned with improving behaviours relating to cancer or sexually-transmitted infections.

3.2.2.3. Exclusion criteria

Exclusion criteria were then applied during full reading of the 70 articles. Articles were excluded if they were lacking in important details as assessed from the article itself, or, if the article is not available during initial assessments, the article's public abstract; although this was avoided wherever possible, and no study was included on the basis of its abstract alone. These included an adequate specification of the print material used and specification of the measures used such that they could be identified and replicated. Studies that were drawn from the same datasets as other included studies were also excluded unless they added other potentially useful methods or measures to the included study. Forty articles were included for full review after this process.

Figure 3 (p87) summarises this process of generating the final list of articles, from initial searches to application of inclusion and exclusion criteria, to arrive at the 40 articles marked as eligible for full review.

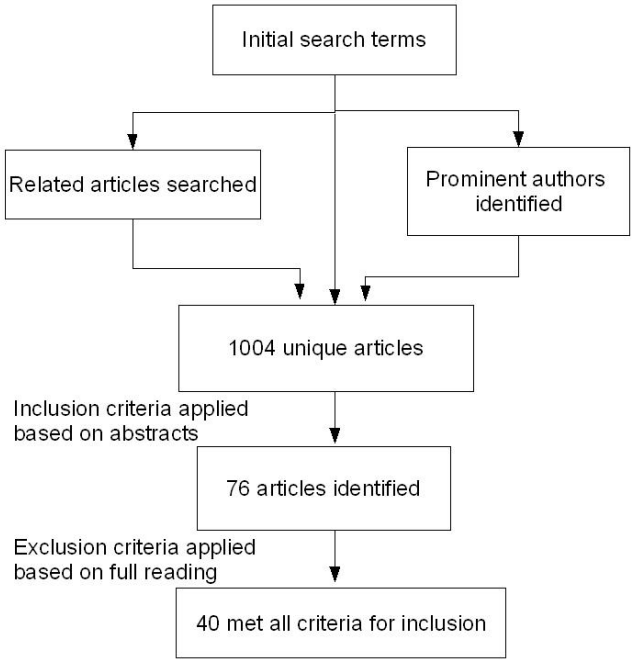
3.2.3. Data extraction and synthesis

Questions for data extraction are summarised in Table 2 (p86). The basic quality criteria that were gathered during data extraction were: n values, research design, measures, independent variables and information sources used. A further question here examined whether the research employed a theoretical framework to guide the design or interpretations of results, and, if so, what. The main question for data reduction was what measures were utilised to examine psychological responses (given that the aim was to inform the design of the experimental series rather than to provide a meta-analysis of findings), and how these measures could be classified into subtypes. One final question did, however, attempt to characterise patterns of significant findings in relation to each of the measures; in seeking appropriate measures for use in this thesis, it would be useful to know in advance whether those measures have a proven sensitivity to information provision in existing studies.

Table 2. Questions for data extraction.

Quality of the studies	Research methods and designs	Measures
What type of intervention controls were used?	What is the research design of the study?	Did the measures fit into general types or classifications?
What was the source of the information materials?	Was a theoretical framework employed to guide the study's design or interpretations of its results, and, if so, what was it?	Were the measures subjective or objective?
What was the n and sample of the study?		Were differences or associations demonstrated on these measures, and if so, what overall pattern was shown?

Figure 3. Flowchart summary of article selection.



3.3. Results

3.3.1. Quality of the studies

Table 3 (p89) shows a summary of the 40 included studies. Three criteria were used to assess the methodological quality: sample size, the type of intervention controls, and the source of the information materials. These criteria were designed to reflect studies' utility to this review as well as general methodological concerns.

Seven of the 40 studies reviewed only compared a single intervention condition to usual care; the rest made comparisons between more than one implementation or type of intervention. Overall sample sizes ranged from 14 to 3185 participants; the reason for this large range appeared to be differing modes of data collection, with larger samples possible with postal and telephone surveys. The largest sample size for in-person research is 419 participants in Cooke et al.'s (2007) study, where company employees were tested in their workplace.

3.3.2. Research methods and designs

Articles were placed into one of four categories to indicate primary method of data collection. These were: telephone survey; postal survey; face-to-face survey; and experimental setting. Postal surveys involved no (or minimal) person-to-person contact with participants; telephone surveys involved one or more interviews (in which standardised measures were usually administered). Face-to-face surveys involved in-person contact with participants, but not necessarily control over the setting of the study (this method was generally used in field or opportunistic research settings). A small number of studies used mixed designs: for example, telephone or in-person interviews to establish baseline measures, and follow-ups achieved via posted surveys. Experimental-setting research methods provide the most control over the environment in which the participant is exposed to the intervention and in which they complete the given measures, because it can be set by the researcher.

3.3.3. Theoretical perspectives

Of the 40 articles examined, only 12 made explicit reference to any specific theory that was used to guide the choice of measures used (and their subsequent analysis) or the design of the interventions. Three of these 12 mentioned Witte's Extended Parallel Processing Model as a guideline for predicting fear and behavioural responses to persuasive messages, although only one employed the range of measures formally proposed by the model (the others used the model in reference only to guide the choice of research question and selection of measures). Only one other theory was used throughout these 12 studies, and this was the Transtheoretical Model (TTM; Prochaska et al., 1997) of assessing an individual's readiness to commit to and carry out behaviour change. The extent to which the TTM was used varied from study to study: whereas one merely used the model to guide the design of the intervention under study, others employed it across the entire study (for example, in the creation of interventions, selection of measures, and analysis of outcomes).

Table 3. Summary of articles included in review.

	Title	Authors	Published	Research Design	Sample
1	Randomised controlled trial of the effect of evidence based information on women's willingness to participate in cervical cancer screening	Adab, Marshall, Rouse, Randhawa, Sangha and Bhangoo(2003)	2003	Experimental/RCT: Control (base info) vs. Modified (base + risk and uncertainty info) leaflets	300 women aged 20 to 64 attending GP practices in Birmingham
2	The effect of format modifications and reading comprehension on recall of informed consent information by low-income parents: a comparison of print, video, and computer-based presentations	Campbell, Goldman, Boccia and Skinner(2004)	2004	Experimental/RCT: 2 (low vs high risk) x 4 (Control (base written info) vs. Enhanced (simpler language + topic headings + print) vs. narrated VT vs. powerpoint format)	233 low-income parents
3	The effect of telephone versus print tailoring for mammography adherence	Champion, Skinner, Hui, Monahan, Juliar, Daggy and Menon(2006)	2006	Experimental/RCT: usual care vs telephone counselling vs print vstelephone+print	1244 women from low-income area general practices
4	Comparison of three interventions to increase mammography screening in low income African American women	Champion, Springston, Saywell Jr., Monahan, Zhao and Russell(Champion et al., 2006)	2006	Experimental/RCT: 2 time period measurements, print vs video vs interactive software	344 low-income African American women
5	A Field Test of a Web-Based Workplace Health Promotion Program to Improve Dietary Practices, Reduce Stress, and Increase Physical Activity: Randomized Controlled Trial	Cook, Billings, Hersch, Back and Hendrickson(2007)	2007	Experimental/RCT: 2 time period measurements, print vs. web-based/multimedia materials	419 employees of a HR company
6	Tailored vs. general information on early detection of cancer: A comparison of the reactions of Dutch adults and its impact on attitudes	De NooijerLechner and De Vries(2002b)	2002	Experimental/RCT: tailored vs general info vs control (no info; but not actually analysed in this article), ppsrecived interventions by post	1040 Dutch Adults
7	Randomized Controlled Trial Comparing the Efficacy of a Video and Information Leaflet Versus Information Leaflet Alone on Patient Knowledge About Surveillance and Cancer Risk in Ulcerative Colitis	Eaden, Abrams, Shears, and Mayberry(2002)	2002	Experimental/RCT: leaflet vs leaflet and video, 3 intervals: before, after, 1 month follow-up	124 UK outpatients
8	Randomised trial of the psychological effect of information about oral cancer in primary care	Humphris, Ireland and Field(2001)	2001	Experimental/RCT: leaflets vs no leaflets/control, single questionnaire afterwards	800 patients at PCT

	Title	Authors	Published	Research Design	Sample
	settings				
9	Tailored messages for breast and cervical cancer screening of low-income and minority women using medical records data	Jibaja-Weissa, Volka, Kingery, Smith and Holcomb(2003)	2003	Experimental/RCT: risk-tailored print vs generic print vs no int	1574 low income/minority women
10	The effect of preferences for print versus telephone interventions on compliance and attrition in a randomized controlled physical activity trial	Lewis, Napolitano, Whiteley and Marcus(2006)	2006	Experimental/RCT: tailored telephone vs tailored print-based vs generic print-based interventions	239 at-risk adults
11	Can Tailored Interventions Increase Mammography Use Among HMO Women?	Lipkus, Rimer, Halabi and Strigo(2000)	2000	Experimental/RCT: usual care vs tailored print vs tailored telephone, 3 time points over 3 years (all post)	1099 women aged 50 and over (recruited from health maintainance organisation in USA)
12	Manipulating Perceptions of Colorectal Cancer Threat: Implications for Screening Intentions and Behaviors	Lipkus, Green and Marcus(2003)	2003	Experimental/RCT: 4 print conditions (risk info, no risk info x severity info/no severity info), 2 time points (pre and post)	119 over-50s who were off-schedule for an FOBT test
13	Effects of Communicating Social Comparison Information on Risk Perceptions for Colorectal Cancer	Lipkus and Klein(2006)	2006	Experimental/RCT: generic CRC risk info vs generic & tailored (absolute risk) CRC risk info vs tailored (absolute and comparative risk) CRC risk info	160 over-50s who were off-schedule for an FOBT test
14	The Efficacy of Tailored Print Materials in Promoting Colorectal Cancer Screening: Results From a Randomized Trial Involving Callers to the National Cancer Institute's Cancer Information Service	Marcus, Mason, Wolfe, Rimer, Lipkus, Strecher, Warneke, Morra, Allen, Davis, Gaier, Graves, Julesberg, Nguyen, Peroccia, Peyer, Wagner, Thomsen and Bright(2005)	2005	Experimental/RCT: 3 time points (baseline, 6m follow-up, 14m follow-up), untailored print vs single tailored print vs multiple tailored print vs recursively tailored multiple print	4014 English speaking over-50s
15	A Comparison of Web and Print Media for Physical Activity Promotion among Adolescent Girls	Marks, Campbell, Ward, Ribisl, Wildemuth and Symons(2006)	2006	Experimental/RCT: web vs print-based intervention, 2 time points of baseline and post	319 middle school girls within one US school district
16	Print Versus Website Physical Activity Programs: A Randomized Trial	Marshall, Leslie, Bauman, Marcus and Owen(2003a)	2003	Experimental/RCT: print vs web-based intervention	655 Australian university staff

	Title	Authors	Published	Research Design	Sample
17	Communicating Cardiovascular Disease Risk Due to Elevated Homocysteine Levels: Using the EPPM to Develop Print Materials	McKay, Berkowitz, Blumberg and Goldberg(2004)	2008	Experimental/RCT: print (high efficacy) vs print (low efficacy)	77 adults over 50 who had participated in a clinical trial
18	Do written education materials that use content and design principles improve older people's knowledge?	McKenna and Scott(2007)	2007	Experimental matched pairs design: revised vs original print information materials (counterbalanced repeated measures design), baseline and 1 month follow-up	14 participants, mean age 74 years
19	Processing Messages About Disease Detection and Health Promotion Behaviors: The Effects of Anxiety	Millar and Millar(1998)	1998	Experimental/RCT: high anxiety inducing paravs low anxiety producing para, followed by messages about health detection or promotion, followed by strong or weak messages about relevant health promotion (2x2x2 design)	171 undergraduates and adults
20	Impact of Diet-Related Cancer Prevention Messages Written with Cognitive and Affective Arguments on Message Characteristics, Stage of Change, and Self-Efficacy	Quintiliani and Carbone(2005)	2005	Experimental/RCT: affective vs cognitive print message interventions, 3 time points	100 university employees
21	A randomized trial of two print interventions to increase colon cancer screening among first-degree relatives	Rawl, Champion, Scott, Zhou, Monahan, Ding, Loehrer and Skinner(2008)	2008	Experimental/RCT: tailored print vs non-tailored print, 3 time-points	140 respondents
22	The short-term impact of tailored mammography decision-making interventions.	Rimer, Halabi, Skinner, Kaplan, Crawford, Samsa, Strigo and Lipkus(2001)	2001	Experimental/RCT: usual care vs tailored print vs TP & phone counselling, 2 time points (12 month follow-up)	1127 female members of a US healthcare programme
23	Can cancer risk information raise awareness without increasing anxiety? A randomized trial	Robb, Miles, Campbell, Evans and Wardle(2006)	2006	Experimental/RCT: control (no info) vs CRC risk factor info vs CRC risk factors and screening info	3185 individuals aged 45-66 registered with GPS in SW England
24	Impact of Risk Information on Perceived Colorectal Cancer Risk: A Randomized Trial	Robb, Miles, Campbell, Evans and Wardle(2008)	2008	Experimental/RCT: control (no info) vs CRC risk factor info vs CRC risk factors and screening info	3185 individuals aged 45-66 registered with GPS in SW England
25	The effects of a genetic information leaflet on public attitudes towards genetic testing	Sanderson, Wardle and Michie(2005)	2005	Exp/RCT: information leaflet vs. no leaflet (materials)	1024 survey respondents (selected from GP registers in UK)

	Title	Authors	Published	Research Design	Sample
26	Impact of Educational Print Materials on Knowledge, Attitudes, and Interest in BRCA1/BRCA2	Schwartz, Benkendorf, Lerman, Isaacs, Ryan-Robertson and Johnson(2001)	2001	Exp/RCT: print genetic vs print breast cancer materials, pre-info baseline and 1 month follow-up	391 women (members of a Jewish organisation)
27	Showing smokers with vascular disease images of their arteries to motivate cessation: A pilot study	Shahab, Hall and Marteau(2007)	2007	Pilot for RCT: printed visual feedback vs verbal feedback, baseline, immediate and 4-week follow-up	23 smokers attending an outpatient clinic
28	A Randomized Controlled Trial of Multiple Tailored Messages for Smoking Cessation Among Callers to the Cancer Information Service	Strecher, Marcus, Bishop, Fleisher, Stengle, Levinson, Fairclough, Wolfe, Morra, Davis, Warnecke, Heimendinger and Nowak(2005)	2005	Exp/RCT:single print guide, single tailored print, multiple tailored materials, sequentially tailored multiple materials; baseline, 5-month and 12-month follow up measures	1,978 smokers calling the NCI's cancer information service
29	Educating African American Men about the Prostate Cancer Screening Dilemma: A Randomized Intervention	Taylor,Davis, Turner, Johnson, Schwartz, Kerner and Leak(2006)		Exp/RCT: video vs print vs waiting list (nothing/control) interventions; baseline, 1 month and 12 month measurements	238 men (members of AA) aged 40-70
30	Randomized Controlled Trial of the Effects of Print Materials and Step Pedometers on Physical Activity and Quality of Life in Breast Cancer Survivors	Vallance, Courneya, Plotnikoff, Yasui and Mackey(2007)	2007	Exp/RCT: standard recommendation vs standard print vs step pedometer vs print & pedometer, baseline and 7-day diary	377 breast cancer survivors
31	Does publicity about cancer screening raise fear of cancer? Randomised trial of the psychological effect of information about cancer screening	Wardle, Taylor, Sutton and Atkin(1999)	1999	Exp/RCT: print information vs no information	2961 adults in Leicester
32	Informed decision making and prostate specific antigen (PSA) testing for prostate cancer: A randomised controlled trial exploring the impact of a brief patient decision aid on men's knowledge, attitudes and intention to be tested	Watson, Hewitson, Brett, Bukach, Evans, Edwards, Elwyn, Cargill and Austoker(2006)	2006	Exp/RCT: print decision aid vs no intervention	990 men aged 40-75 from 11 UK GPs
33	The effectiveness of printed and videotaped materials about colon cancer	Meade, McKinney and Barnas(1994)	1994	Exp/RCT: print booklet vs videotape vs no intervention	1100 participants
34	Increasing fruit and vegetable intake among adults attending colorectal cancer screening: The efficacy of a brief tailored intervention.	Baker and Wardle(2002)	2002	Exp/RCT: print intervention vs no intervention, baseline and 6 week follow-up	742 participants aged 55-64

	Title	Authors	Published	Research Design	Sample
35	A tailored minimal self-help intervention to promote condom use in young women: Results from a randomized trial	Scholes, McBride, Grothaus, Civic, Ichikawa and Fish(2003)	2003	Exp/RCT: usual care vs tailored print materials, baseline and 6-month follow-up	1210 women aged 18-24
36	Testing different formats for communicating colorectal cancer risk.	Lipkus, Crawford, Fenn, Biradavolu, Binder and Marcus(1999)	1999	Exp/RCT: 4 print conditions. 2 (comparative risk component present vs not present) x 2 (risk factor info present vs not present)	122 male and female participants aged 50 and over, general population
37	A cost-effectiveness comparison of three tailored interventions to increase mammography screening.	Saywell, Champion, Skinner, Menon and Daggy(2004)	2004	Exp/RCT: tailored print vs tailored phone vs both vs usual care	1044 participants
38	Increasing mammography among women aged 40–74 by use of a stage-matched, tailored intervention	Rakowski, Ehrich, Goldstein, Rimer, Pearlman, Clark, Velicer and Woolverton(1998)	1998	Exp/RCT: no materials vs standard print vs stage-matched print, baseline and follow-up	1864 women aged 40–74
39	The experimental evaluation of an oral cancer information leaflet	Humphris, Duncalf, Holt and Field(1999)	1999	Describes 3 studies in which leaflet is designed, measure is validated, then leaflet is evaluated via knowledge measure. Study 3: Exp/RCT: no print leaflet vs print leaflet, pre and post leaflet (includes one group with leaflet but no baseline)	136 participants
40	A randomized controlled study of short-term and long-term effects of tailored information versus general information on intention and behavior related to early detection of cancer.	De Nooijer, Lechner, Candel and de Vries(2002a)	2002	Exp/RCT: tailored vs standard print, pre-test, 2 x post-tests	1358 male and female participants, recruited from local and national ads

3.3.4. Overview of topics and measures

Within the studies reviewed, a group was identified that was concerned with comparing novel interventions developed using theory (or in some cases more informally) with usual care or an existing intervention, and the emphasis in these studies was usually on demonstrable benefits in terms of policy and health. Of these studies, nine examined behavioural responses, with all nine finding positive effects of the novel intervention (1, 8, 18, 27, 29, 30, 34, 35, 38). Six studies showed positive effects of the novel intervention in terms of knowledge uptake (18, 29, 30, 34, 39). Three studies examined affective/emotional response via measures of mood, but none of these showed effects in response to information provision (8, 31, 34).

The remaining 31 studies had more specific goals in terms of varying the information sources. Some assessed the impact of the format in which the intervention was provided; that is, the intervention was designed with the same principles across each condition, but the format in which is was presented was varied (for example, print versus web-based presentation). Two studies of this type showed positive significant behavioural effects in response to a novel information format (4, 15), but three others found no differences (8, 31, 34). Only three assessed knowledge: two showed no significant effects of intervention format (7, 33), and one showed an increase in knowledge with the novel format (32).

Other studies examined the impact of tailoring information sources based on demographic or personalised factors. In these studies the most common comparison was made between tailored and untailored interventions: 7 of these studies showed positive effects on behavioural responses when using tailored information (3, 6, 11,14, 22, 38, 40), one no significant effects (28), and two showed smaller behavioural effects in the tailored group (9, 21). One study found an improvement in knowledge associated with tailoring (22).

Finally, ten studies assessed the impact of specific message factors; risk content, severity, framing, amount of content, and cognitive versus emotional content. Two

studies showed positive effects of message content factors on behaviour (12, 23); two showed negative effects (20, 26); and a further two showed non-significant effects (34, 36). Three assessed knowledge, and each showed positive uptake effects (17, 23, 26). One study found a non-significant effect of message factors on affective responses (36).

3.3.5. Measures used

Initially, a list of common measure types was extracted from the 40 articles. Four main types of measure were identified based around the underlying psychological process accessed or intended purpose of the measure: these were knowledge, behaviour, intervention evaluation and attitudes/beliefs. Measure types that did not fit into one of these four categories or were used more sparingly were presented separately from these main categories. Each type of measure within these categories was also assessed in terms of its subjectivity versus objectivity, referring to how susceptible the measure might be to individual biases and characteristics. Subjective measures are inherently linked to the individual's perception of what is being assessed, and so are suited to examining attitudes and evaluations. Objective measures refer to those which can be tallied with external sources of verification: for example, 'quiz'-style measures or observed behaviours.

On initial examinations of the range of measures employed in the 40 studies, it was noted that most compared employed both subjective and objective measures. Given the emotive and somewhat personal central health theme of this thesis – a sexually transmitted infection – the differences between subjective and objective measures were considered to be a useful topic to consider in more detail. Different types of measure may produce different outcomes depending on the characteristics of the topic under study, and one possible way of accounting for these differences may be in the subjectivity or objectivity of the measure used.

3.3.5.1. Knowledge

A subjective measure of knowledge refers to a participant's perception of his or her own knowledge on a given topic. The main benefit of using a subjective measure of knowledge is that it can be assessed via a single question (e.g. 'have you heard of a condition called Chlamydia'), although a major drawback is that the participant may not want (or be able to) provide an accurate answer to this question. Three of the studies reviewed employed subjective measures of knowledge, and each found significantly higher subjective knowledge in novel information conditions compared to controls (6, 15, 16).

Objective measures of knowledge are those which test performance on a scale, where the most common format is as a series of quiz-style items, where statements relating to the target subject are judged true or false. Studies also tended to employ measures of recognition or recall, and these various measures were grouped together for the purposes of this analysis. (It should be noted however that recognition knowledge is assessed by identification of the elements of the information after presentation, and recall by explicit reproduction of those elements. Recognition is generally considered to lead to better performance: e.g. Corballis, 1967.) Of the 12 studies using objective measures of knowledge, two showed non-significant effects of the novel information source (2, 7), and 10 studies showed significant increases in knowledge associated with the experimental condition compared with controls (17, 18, 22, 23, 26, 29, 30, 32, 34, 40).Looking across these studies included in this analysis, subjective and objective knowledge appeared to be relatively easy to improve by interventions, or by modification of existing interventions.

3.3.5.2. Behaviour

Measures of behaviour can also be split into subjective and objective types. In this review a subjective measure of behaviour is one that is based on self-report, encompassing intentions to carry out behaviours in the future, or willingness to commit to behaviours. Subjective measures of behaviour were the most commonly used across these articles. In all cases, these measures examined positive or desirable behaviours (that is, those behaviours that the intervention was designed to elicit). Of the studies reviewed, 13 showed increases in behaviour associated with the novel information

provided (1, 12, 13, 15, 16, 22, 23, 27, 28, 30, 34, 35, 40). One showed a significant associated decrease in relevant behaviour (26). Seven studies showed no significant effects on subjective measures of behaviour (5, 10, 24, 23, 32, 33, 36).

An objective measure of behaviour is either based on observed or recorded behaviour. Seven studies showed significant positive effects in terms of objective behavioural outcomes (3, 11, 12, 15, 22, 29, 28), and one a negative effect (9). Three studies showed no significant effects in terms of objective behaviours (13, 21, 37).

The majority of studies reviewed show increases in both types of measure of behaviour when a novel intervention is compared with controls, but this should perhaps be interpreted with some degree of caution; it seems reasonable to suggest that non-significant results in terms of behaviour are less likely to be reported or published than significant ones.

3.3.5.3. Evaluation

Evaluation-based measures are used here as a blanket term covering those measures which require the participant to evaluate the information or intervention by its value, whether on a standalone construct or by comparison with other types of information/intervention. These were used less than knowledge or behaviour-type measures, and are, in general, subjective measures by definition. The simplest form of measure in this class is forced choice preferences of information source. This was, of course, only possible to obtain in those studies where participants were (eventually) given all possible information sources in the study. Only two studies used this method, where following the randomised arm of the study all sources were presented. One of these (18) found a significant effect with tailored materials were preferred to untailored. In the other, preferences were used as a predictor variable for evaluations of content (10). Material evaluations were more evident through the studies reviewed: these measures involved one or more researcher-selected terms or dimensions by which respondents would evaluate the information source: for example, on dimensions of sufficiency of content or readability of the information source. Four studies showed

that novel information sources scored higher on material evaluations (5, 6, 19, 20), with a further two others finding no significant effects (17, 21).

Process variables are a sub-type of these evaluation measures, and rather than question the respondent's perceived response to the information, they examine how the information/intervention was used by the participant (e.g. number of times an information source website was visited). Two studies showed increases in process variables in the novel information provision source condition when compared to controls (14, 29), but three studies reported no effects (15, 21, 28).

3.3.5.4. Beliefs and Attitudes

Like evaluations, conventional measures of attitudes and beliefs are subjective by definition. Initial analysis of the range of measures used identified three commonly-used sub-types of attitudinal measure: efficacy, threat perceptions, and personal risk perceptions. The latter is used most often: nine studies examined perceptions of personal risk for the target condition. Results were mixed here: four studies showed significant increases in risk perceptions associated with the novel information condition (13, 22, 27, 36), two showed a negative association (12, 31), and three had non-significant effects (8, 21, 24).

Four studies measured self-efficacy as an outcome variable: one of these showed significantly higher efficacy in participants provided with experimental information sources than controls (35), another showed lower self-efficacy (18) and two showed no effect (5, 21). Only one study used threat perception as the outcome variable, finding that increasingly tailored health information increased related health threat perceptions (18). This study (18) employed both efficacy and threat perceptions as part of the Extended Parallel Processing Model's primary diagnostic instrument (the Risk Behaviour Diagnosis Scale) although in this case these variables were combined to generate a critical value (determining whether the individual falls into a fear or danger control state; see the previous chapter for a discussion of this model and instrument).

3.3.5.5. Emotional responses.

Only a limited number of studies examined emotional response. These are again, in general, self-report by definition (although more objective measures of affect and emotion will be explored in this thesis). These measures can be split into those that examine positive and negative affect. Measures of negative affect included those that used standardised measures of anxiety (for example the State-Trait Anxiety Index; Marteau & Bekker, 1992; Spielberger, 1983) or more informal constructs. Seven studies used measures of negative affect, with three of these showing less negative affect associated with the novel information/intervention (6, 25, 31), and four showing no significant effects (22, 23, 24, 36). Measures of positive affect were the most rarely-used of all; the one study that did (25) showed a positive effect of the novel information in terms of positive affect (note that this study also showed a decrease in negative affect).

3.4. Discussion

The 40 studies considered in this review had a diverse range of goals and aims, but used a comparatively homogenous set of research methodologies. The most basic template for a study evaluating the impact of print information is simply presentation followed by measurement of relevant variables (often with only general report of how the material appeared), and these types of studies were not examined here because they do not use control groups. A basic experiment to assess print information would compare a target information source with one or more comparable control, and may also employ repeated measures which permit analyses of how these measures change over the course of the study (usually before and after the presentation of information).

A notable feature of the measures used in the studies reviewed here was that they were used for various different purposes. For example, in some cases attitudes were used as simple outcomes to examine the effects of interventions; in others as moderators or predictors of behaviours or behavioural intentions. The study of the effects of imagery

on smoking cessation by Shahab, Hall and Marteau (2007) was the one to consider attitudes as both outcomes and predictors.

None of the studies reviewed examined automatic associations (as either outcome or predictor variable or using methods that could be termed implicit or explicit), although given the relative novelty of this class of measures this is to be expected. More surprising was that self-reported emotional responses were not often examined, or not in detail; only a small number of studies employed measures of anxiety or other affective reactions. Studies that examined variables based around threat and susceptibility (for example, those based on the EPPM) did not examine 'felt' emotional responses, even though the EPPM specifies a role for fear in determining responses to interventions. Neither were the intervention materials evaluated in terms of their emotional content.

Although all the studies reviewed here examined responses to printed information, their overarching goals varied. Some aimed to test a hypothesis regarding information materials, most prominently those examining the effect of tailoring. Tailoring refers to making changes to information materials based on the individual characteristics of the reader, and may have a beneficial effect on information uptake and message acceptance: one common method for examining the effects of tailoring health promotion material, then, is to compare an existing source with a modified 'tailored' version. Comparing the effects of two intervention types may be sufficient with such an aim, as the overall goal is usually to comment upon whether the principle under study is worth applying more widely as a matter of standard care.

In cases where researchers were interested in the effects of an intervention compared to usual care, it is more appropriate to include a control condition where the intervention is not administered (as opposed to an alternative intervention). Therefore, depending on their needs, the studies covered here addressed either comparisons between types of interventions, or comparison of the effects of an intervention as opposed to usual care. The two goals were not mutually exclusive; on the contrary, a number included both absolute and comparative controls. One advantage of including both comparative and usual-care control conditions is that different interventions can be compared to not only one another, but also to baseline/usual care cases. Both of these designs are useful in

assessing the relative effectiveness of interventions, because they permit analyses of their independent effects when compared to baseline results. An alternative method of establishing baselines is to employ a repeated measures design, which permits analyses of changes in behaviours/attitudes over time. A repeated-measures design, where appropriate, may eliminate the need for a no-information control condition; this may introduce a potential cohort confound (any absolute changes detected over time may be due to cohort effects over time rather than the intervention used), although using a short test-retest interval would alleviate this concern.

The overarching aims of the studies reviewed impacted not only their designs but also the range of measures employed in some cases. In general terms, two extreme examples can be characterised. Studies that aimed to assess the effectiveness of a certain intervention in a given population tended to examine the distal target of behaviour change. At the other extreme, studies examining why a given intervention has worked in the past (which is a more open-ended research question) used a wide range of measures, relating to attitude changes and processing of the message. In practice, some of the studies covered in this review sit between these extreme examples: testing the effects of interventions while attempting to understand the processes that facilitate these effects. Some used theoretical approaches to inform their understandings of the links between attitudinal and behavioural change. However, many studies included a range of measures and variables without specifying an overall theoretical framework, with the general principle that the more positive change effected by the intervention the better; it is desirable that an intervention may change attitudes or behaviour, but even more so if both. In such cases, it is likely that the focus of the study will be in evaluating the intervention/information, rather than testing theoretical issues.

3.4.1. Conclusions

The aims of this review were to examine how responses to health information have been studied in previous research, and use these studies to aid in generation of a research paradigm for use in the current work. This body of previous research was intended to inform the current work in terms of a number of basic research methods,

including study design and measure selection, but not necessarily in terms of outcomes (due to the diversity of the studies examined).

The designs of the studies reviewed here remained reasonably stable across the (limited) range of examined articles, with randomised between-subjects allocation to intervention conditions used most often: the main variation in structure (other than the number of levels of the independent variable) was whether and how repeated measures were used. In part this seemed to depend on the method of data collection used and the scale of the study, but also on the key outcome variables. In studies which employed a repeated measures design, there was a great deal of variation in terms of how long a time-delay was left between measurements, and given that behaviour change was the primary outcome in most of the studies examined, the length of the delay may be tailored to allow the target behaviour to become evident (for example, long enough to book and attend a screening appointment or embark upon an exercise programme).

Very few studies employed repeated measures immediately preceding and following the presentation of the intervention (or the intervention materials). This is understandable given the aforementioned focus on observable or reported behaviours. It may, however, partially explain the lack of attention given to immediate psychological responses in these studies: immediate responses and evaluations would be very difficult to obtain if the points of measurement were temporally distant from the presentation of the information or intervention materials.

Whereas the basic structure of the reviewed studies could be described as stable, the range of measures employed by each varied wildly: indeed the most common class of variable measured (behaviours) was not ubiquitous throughout. No study included a measure across each of the higher-order classes that were set out at the start of this chapter (that is: knowledge, behaviour, evaluative response, attitudes and emotional response).

3.4.2. Implications for study chapters

Of the many measures used across the studies reviewed here, not all can be employed in this experimental series. The purpose of this section is to outline which measures which will be used, and, in cases where the measures reviewed are not suitable, explain how they can be tailored to the current purpose or new measures brought in from other research.

3.4.2.1. Affective responses

In the studies reviewed, the State-Trait Anxiety Index (Marteau & Bekker, 1992; Spielberger, 1983) was the most common standardised instrument used to examine affective responses. The purpose of using this instrument in the current experimental series wouldbe to examine whether exposure to the provided information made participants more anxious. Another useful property of this instrument is that it examines self-perceived anxiety independent of explicit evaluations of the material; that is, rather than asking participants their feelings about the material, their feelings are assessed after having been exposed to that material. Assessment of affect is therefore separable from explicit evaluation of the material. There are a number of variations of the instrument: the full version of the scale (Spielberger, 1983) contains both state and trait subscales. Previous studies of the state subscale of the STAI (e.g. Marteau & Bekker, 1992) have found a population norm of 35, with scores above 49 being found in those women with anxiety disorders. Clinical cut-offs are not set out for the trait subscale, but means of approximately 36 have been observed in non-clinical samples in the UK (e.g. Mogg et al., 2004). Estimates of .83-.90 have been achieved in internal validation of the shortened 6-item version of the scale with adult women (Marteau and Bekker, 1992), and these studies have used a prorated population norm of 10.5, with scores above approximately 15 being found in those women with anxiety disorders. The 6-item version of the STAI is shown in Appendix 2 (p281).

Some studies reviewed also employed the Positive and Negative Affect Schedule (Watson et al., 1988a). Unlike the STAI, this instrument also assesses positive affect

alongside negative affect. Mixed emotions, that is those both positive and negative, were discussed as possible responses to HPV information in Chapter 1; the instrument may therefore be useful in this experimental series. The authors of the PANAS showed acceptable reliability estimates for both subscales: for the Positive Affect Scale, the Cronbach alpha coefficient was 0.86 to 0.90; for the Negative Affect Scale, 0.84 to 0.87. The PANAS is shown in Appendix 5 (p294).

3.4.2.2. Behavioural response

Measures of behaviour in the studies reviewed were, as has been discussed, split into objective and subjective types. Unfortunately in the present series it was not possible to explore the use of objective types, as the studies were to be carried out in a non-clinical setting. Of the objective types, behavioural measures in the studies reviewed were tailored to the behaviour under examination. This approach was therefore also used here: in the current studies, behavioural intentions were assessed via subjective measures of agreement with statements relating to vaccination behaviour, quantified with likert scales (examples of these statements as used in the initial study in Chapter 4: *When you are older and are invited for a smear test, how likely is it that you will go; If you were offered a test for HPV in the future, how likely is it that you would have one; If you were invited to have HPV vaccination, how likely would you be to have it?).* Similar measures have also been used to examine behavioural intentions in a number of previous studies (Rothman et al., 1993; Detweiler et al., 1999; Jeong & Lambert, 2001).

3.4.2.3. Cognitive response

The literature reviewed in this chapter showed that knowledge can be assessed subjectively, but that objective assessments are also achievable. None of the reviewed studies employed a measure of HPV knowledge; however a 15-item HPV knowledge scale, developed following examination of previous reviews of HPV awareness (Cuschieri et al., 2006; Waller et al., 2003c) and consultation with experts in health psychology and gynaecology, was available. This consisted of a list of 15 statements about HPV (e.g. 'HPV often has no visible signs or symptoms') which participants

evaluated as true or false (with a third option for 'don't know', scored as incorrect). This tool was previously used by Marlow et al. (2008).

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3.4.2.4. Evaluative response

Subjective evaluations of content were used in the first study of this experimental series and are presented in Chapter 4 (see p115). As discussed previously in the findings from the review (see p97), evaluations are subjective by definition. A forced-choice preference was not suitable due to the randomised control methodology that was to be used; eliciting preferences would require participants to be exposed to each of the control and experimental information sources in detail. The items used to elicit evaluations were novel and based on the concepts that participants spontaneously generated during qualitative work carried out by Waller and colleagues; participants evaluated the information on dimensions of *reassuring*, *scary*, and *interesting* using likert scales. The *scary* item reflected the idea that the link between an STI and cervical cancer had the potential to induce fear. The *interesting* item was intended to reflect general engagement with the material, as women in the earlier quantitative studies often stated that the information was of interest (even if they did not think that it was especially relevant to them). The *reassuring* item was intended to assess a possible positive response to the information. The questions about the information's content were intended to assess participants' perceptions of their own information uptake, which may be useful in making future revisions of the information. They were all asked whether the leaflet content was adequate (with three response categories of *too little information, about right*, and *too much*), and whether they would want to find out more about the subject (using five-point likert scales, labelled 'very unlikely' to 'very likely').

3.4.2.5. Attitudinal response

Like behavioural measures, measures of attitudes in the studies reviewed were often assessed via individually tailored items. Accordingly, at the outset of this experimental series, were assessed using a similar format to behavioural intentions; here, the

statements used did not have a behavioural component however, and related only to attitudes. The statements were drawn from previous work in HPV attitude research (see Marlow et al., 2009a). In the initial study reported in Chapter 4, two types of attitude were assessed: these were attitudes toward HPV vaccination (e.g. *I would want to be on the safe side and have the HPV vaccination)*, and attitudes toward vaccination in general (*vaccinations are effective in preventing disease)*. These are shown in full in Appendix 2 (p281).

3.4.2.6. Setting and design

The studies reviewed demonstrated a number of methods and measures that are carried over into the original research described in this thesis, but also showed a number of areas that may be expanded upon. Firstly, it is suggested that any attempt to take a more systematic approach to information evaluation should consider responses based on a range of measures encompassing knowledge, behaviour, evaluative responses, attitudes and emotional responses. Even if it is not possible to predict how these variables should interact at the outset of these studies, explorations of interactions between each may prove informative as to their roles in determining reactions to health information. Secondly, the measures used previously to access emotional responses do not seem sufficient to address the concerns outlined in the theoretical review chapter; in particular, an objective measure of emotional response would be a useful tool here. Finally, the focus on psychological responses would suggest that where possible, there should be very little temporal delay between presentation of the information materials and the measures under study.

The studies reviewed were conducted in a variety of settings, and it was observed that those where data collection was conducted by postal or telephone survey had larger samples than those conducted by individual sessions with participants. A compromise was demonstrated by Marshall et al. (2003) who recruited participants from within a workplace; an adaptation of this approach that is used in the current experimental series is to recruit adolescent participants from a school, and conduct the research in this field setting. However, where more in-depth measures are required, individual sessions with participants in a laboratory setting will be used.

3.5. Summary of introductory chapters and introduction to data chapters

The narrative review presented in this chapter has examined previous studies with the broad goal of evaluating health promotion interventions, in order to inform the methods used in the original research that follows. Four chapters then report the results from four research studies. Chapter 4 represents the first use of the methods that are settled upon, and along with making an exploratory investigation of some of the theoretical issues discussed here, also represents a timely exploration of young women's (of the age targeted by the HPV vaccination 'catch-up' programme) responses to naturalistic health information materials. The experimental methodology introduced is then refined in a more controlled setting over the course of the following three studies. The research described in Chapter 5 employs a more rigorous repeated-measures design and examines whether presentation of health information brings about changes in implicit attitudes. Chapter 6 then describes a similar study designed to control for format and style in health information materials with differences in core content used as the central manipulation, and also to examine whether the differences observed in earlier studies can be explained by perceptions of threat, efficacy, or even simple memory effects. Chapter 7 refines this paradigm further, attempting to generate an instrument of explicit evaluation and understand the various implicit attitudinal effects that have been shown in the previous studies. Chapter 8 then reports a series of analyses across the three lab-based studies, the purpose of which is to examine associations between implicit and explicit measures of cancer-related affect (along with a methodological comparison between categorical label types in an IAT-type task). All results are then summarised and discussed in Chapter 9.

4. A systematic examination of responses to HPV information in an adolescent sample

4.1. Introduction

The study presented in this chapter was a first step towards the goal of making a systematic assessment of responses to health messages [2]. It was also, more specifically, an attempt to explore young women's responses to information about vaccination and HPV ahead of the vaccination programme, given that this work was carried out in the second quarter of 2007, some time before the introduction of the vaccination programme. When designing and carrying out the study, it was expected that the vaccination programme would be introduced and in operation within 18 months, and that vaccination would be offered to young women around the age of 13 (although this was subject to change).

4.1.1. Background

The research reviewed in Chapter 1 covered the role of HPV infection in the development of cervical cancer (p15) and the use of vaccines against the infection in cancer prevention (p18), along with the challenges involved in this: including difficulties in HPV information provision (p43) and related concerns of informed consent and decision-making (p22), and the possibility that informing women about a link between a common STI and cancer may raise anxiety and impact uptake of the HPV vaccine (p35). Chapter 2 then introduced two bodies of theory that proposed methodologies for investigating these various issues, including dual-processing (p49) and methods derived from fear appeals research (p70). This informed the review of print-based interventions in Chapter 3 (p81), which identified methods and

[2] A version of this study waspublished in the November 2009 issue of the Journal of Adolescent Health (see Appendix 3).

methodologies suitable for use in this research, with section 3.4.2 (p103) identifying useful measures. It was intended that these measures assess responses across five constructs: knowledge uptake, affective response, content evaluation, attitudes and behaviour.

While previous evidence has shown that HPV knowledge can be boosted by information provision (e.g. Chan et al., 2009, as discussed on p39), qualitative evidence has suggested that affective responses to HPV information are primarily negative (as discussed in section 1.3.6, p35). In the present study it is expected that negative responses to HPV information will be observed on measures of not only affect, but also evaluation, attitudes and behaviour. This approach, in assuming a general negative response to HPV information that impacts upon all other psychological responses, is based on the review of theory in Chapter 2, and both the principles of dual-processing theory (p49) and the extended parallel processing model of fear appeals (p70). The reviews of these theories in Chapter 2 showed that affective responses could impact upon wider psychological responses and behaviour; dual-processing suggests that affect may influence, or is at least linked with, explicit reasoning and decision-making; in particular, Damaiso's (1994) view was that affect and emotion might act as a primary regulator for human decision-making and, subsequently, behaviour. The literature on fear appeals (see the review of the EPPM; p70) also demonstrates the role that explicit fear and threat perceptions play in health related behaviour. The utility of this study in relation to earlier work in HPV information provision is therefore to examine whether an overall pattern of negative responding does emerge, as has been suggest by earlier studies of the type reviewed in Chapter 1, and whether this pattern is unique to HPV information provision (as when measured against control information materials). While studies have also shown more positive responses to certain aspects of HPV information – including vaccination –these appeared to be more complex and sometimes observed alongside caution and concern (as with Waller et al., 2006, as is discussed on p37).

It is also possible to examine the impact of knowledge on affect and behaviour by including this range of measures: Chan et al.'s (2009) study, by making a repeated measures assessment of behavioural intentions prior to and following provision of HPV information, surmised that vaccination intentions may receive a small but significant boost by the provision of HPV information. The present study will however be able to

examine whether knowledge mediates the effect of information provision on behaviour (and also affect), and ascertain whether simply knowing more about HPV is sufficient to make individuals anxious or change their behaviour (or both).

Measures of knowledge and affective response were covered in Chapter 3 (respectively, p104 and p103), and evaluation of the information's content was made by a number of items drawn up from examination of previous qualitative research, including perceived fear content. Chapter 3's review also concluded that other measures would need to be adapted to the current studies in order to better evaluate behavioural intentions and attitudinal and affective responses. As discussed in the previous chapter, it was necessary to adapt attitudinal and behavioural measures to the target attitudes and behaviours. Attitudinal measures examined attitudes toward vaccination in general and HPV vaccination. Measures of behavioural intentions were also set out in Chapter 3 (see p104); although limited evidence has showed boosted HPV vaccination intentions following presentation of HPV information (see p40; see also the discussion of Chan et al., 2009, p39), this has not been examined in adolescents in a randomised control study.

In this study an HPV information source was assessed which had been designed following interviews and focus groups to meet women's information requirements and preferences (Waller et al., 2006a; Waller et al., 2005a), and this leaflet was used as the template for the design of the other information leaflets. Waller et al. (2005) conducted a series of focus groups and interviews with adult women that informed the design and content of the HPV information leaflet. In the 2005 study, 74 in-depth interviews were conducted with adult women, with the emergent themes extracted from these sessions (via Framework Analysis, as set out by Ritchie & Spencer, 1994) informing the 2006 study. In the latter study 24 women were recruited to participate in four focus groups; all were mothers of girls aged 8 to 14. In the course of these sessions, participants' preferences for the inclusion of specific facts about HPV and cervical cancer and their order in an information source were elicited. A further study (see Marlow et al., 2009b) refined these preferences again in individual interviews with 21 adult women aged between 18 and 53 years old, where a consensus emerged over the most important issues in the provided information about HPV, and highlighted areas that should be expanded upon.

A further two information leaflets were produced and used as experimental controls, with efforts made to ensure similar design and amount/type of content throughout the three sources. All leaflets consisted of a single double-sided, colour-printed sheet folded twice to produce six reading surfaces; this was designed to resemble standard NHS information leaflets (see Appendix 4 for an example of an NHS breast cancer information leaflet). Each had a title page, and contact details for a further information source on the back page. Content in each of the three sources was split into broad subheadings, and each contained at least two full colour images. As is shown in the appendices these images were photographs of individuals or line drawings, in each case obtained from open-copyright sources. The three leaflets are shown in Appendix 1 (p278).

The first control leaflet controlled for the presence of health related information in the content, and, like the HPV leaflet, included sexual transmission information. It did not, however, contain information about cancer. Accordingly, it was expected that this information would be evaluated less negatively than that on HPV, but more negatively than information that contained neither information about an STI nor cancer. Information about Chlamydia was employed due to its sharing a number of similar traits with HPV: infection with Chlamydia does not necessarily lead to obvious symptoms, and has no specific treatment option other than the action of the immune system, but is not linked with cancer. The material on Chlamydia was based on information from a single website targeted at a teenage demographic. Information in this source was split into the following headings: Diagnosis and Treatment (describing how Chlamydia is tested for and recommendations for those who have it), Getting It (describing how the infection is transmitted), Signs and Symptoms, and Long-Term Effects (describing the possible negative outcomes of a persistent untreated infection with Chlamydia).

The purpose of the second control was to examine the impact of any information exposure (that is, even on a non-health related topic); because this information leaflet contained neither cancer related information not sexual transmission information, it was predicted that this leaflet would have a smaller impact than either the HPV or Chlamydia leaflets. The leaflet in this condition described environmental problems and how these may be eased by recycling; this information therefore still contained advice

on behaviour that could avoid future problems, but contained no references to health, cancer, or STIs. The home waste/environmental leaflet was collated from a number of websites. This source had the following headings: What A Waste (including statistics and environmental effects relating to wastage), London (describing local effects), Become a Recycler (describing the positive impacts and benefits of recycling) and Tips and Hints (including practical advice on how to recycle and conserve energy). The images in the control leaflets were drawn from the same sources as the content. (More negative cancer attitudes in response to chlamydia information as compared to environmental information were not predicted however, as measures of attitudes are specific to vaccination and cancer.)

4.1.2. Aims

The present study used an experimental methodology to assess affective, attitudinal and behavioural responses to HPV information in young women aged 13 to 16 (in the age range for vaccination), as well as assess explicit content evaluations of the information. Six hypotheses were set out according to the literature reviewed in Chapter 1 (specifically see the review of adolescent awareness, p32) and the previous findings reviewed in Chapter 3 (p81; specifically the implications for these studies summarised at the end of Chapter 3, p103.). Earlier research showed that presentation of information can boost HPV knowledge; a measure of HPV knowledge (drawn from earlier research; see p95) was also therefore employed to ensure that the information was adequately understood. This measure was also examined as a potential mediator of affective and behavioural outcomes in order to examine whether HPV knowledge can bring about affective or behavioural responses.

The review of theory in Chapter 2 emphasised the importance of general negative affect in determining a range of associated psychological responses, and the majority of previous research has shown the potential negative emotional impact of HPV information. From the evidence reviewed in Chapter 1, this negative impact appears to be largely based on the combination of information about sexual transmission and cancer: it is therefore expected that psychological responses will be negative in comparison with control groups. More specifically, given that the Chlamydia

information leaflet only provides information about an STI (and not cancer), it is expected that this leaflet will produce less negative responses than the HPV leaflet, but not the environmental leaflet which contains neither information about cancer nor sexual transmission. This pattern of negative responses to HPV information is predicted on measures of affective response, content evaluation, attitudes and behaviour.

4.1.3. Hypotheses

It was hypothesised that:

1. Participants presented with HPV information would show higher knowledge on the topic of HPV than those presented with other forms of information.
2. Participants presented with HPV information would show more negative affect than those presented with Chlamydia or environmental information, and those presented with Chlamydia information would show more negative affect than those presented with environmental information.
3. HPV information would be evaluated more negatively than Chlamydia or environmental information, and Chlamydia information would be evaluated more negatively than environmental information.
4. Participants presented with HPV information would show significantly more negative attitudes to cancer than those given Chlamydia or environmental information.
5. Presentation of HPV information would result in lower behavioural intentions in relation to screening than Chlamydia or environmental information, and Chlamydia information would result in lower intentions than those presented with environmental information.
6. Knowledge of HPV would have a significant mediating effect on any observed relationships between information condition and anxiety, and information condition and behavioural intentions.

4.2. Methods

4.2.1. Study sample

The UCL Research Ethics Committee approved the study (see Appendix 16). Invitations to participate were extended to a number of young women's schools in the London area, identified through contacts within the research group, and two schools consented to participate. 175 young women in Years 9 and 10 (age 14-16 years) at these two schools were invited to take part. Parents were informed about the research and given the option to exclude their daughter from participation, and students were offered participation in the study on an opt-in basis with each filling in a consent form. One student in the sessions did not participate based on parental advice; 174 participants were therefore involved. A sample size of 159 gave 80% power to detect medium-sized effects (.25, in line with Cohen's 1977 definition of effect size conventions) in analyses of variance (ANOVA) with three levels of independent variable. Testing was carried out in six classroom sessions; half were with young women in year 9, and half with those in year 10.

4.2.2. Materials

Copies of the three information sources are shown in Appendix 1 (p278).

4.2.3. Design

A between subjects design was employed, with three levels of the independent variable of information type provided (HPV, Chlamydia, environmental). A range of dependent variables were used, and these were split into the five groups described in section 4.2.5.

4.2.4. Measures

4.2.4.1. Knowledge

An objective measure of HPV knowledge (as defined during the literature of previous methods in Chapter 3; p95) was used consisting of 15 statements about HPV (e.g. 'HPV often has no visible signs or symptoms') which participants evaluated as true or false (with a third option for 'don't know', scored as incorrect). This scale was previously used by Marlow et al. (2008) and was discussed in more detail in Chapter 3 (see p104).

4.2.4.2. Affective responses

Anxiety was assessed with the shortened 6-item version of the State-Trait Anxiety Inventory (Marteau & Bekker, 1992; Spielberger, 1983). Responses on the STAI are given on 4-tem likert scales labelled 'not at all,' 'somewhat,' 'moderately,' and 'very much.' The scale's items measure agreement with statements in the form of '*I am calm'* or '*I feel tense*.' The scale is shown in Appendix 2 (p281).

4.2.4.3. Content evaluation responses

Participants evaluated the information on dimensions of *reassuring*, *scary*, and *interesting* using five-point likert scales labelled from 1 to 5, with 1 labelled 'not at all' and 5 'very.' They were all asked whether the leaflet content was adequate (with three response categories of *too little information, about right*, and *too much*), and whether they would want to find out more about the subject (using five-point likert scales again labelled from 1 to 5, with 1 labelled 'not at all' and 5 'very much so.'). These items are shown in Appendix 2 (p281).

4.2.4.4. Attitudinal responses

Attitudes towards HPV vaccination were measured by assessing whether the respondent agreed or disagreed with six statements using a four-point likert scale labelled 'strongly disagree,' 'disagree,' 'agree,' 'strongly agree'. These items were given to all participants: one sentence about the existence of an HPV vaccine was embedded in the questionnaire preceding these questions. These items were drawn from previous work within the research group as identified by Chapter 3's literature review (see p106, specifically the discussion of Marlow et al., 2009). These items were *I would want to be on the safe side and have the HPV vaccination*; *I would be very worried about side effects of the HPV vaccination*; *having the vaccination would be a good way to protect myself against cervical cancer*; *having the vaccination would be a good way to protect myself from HPV*; *having the HPV vaccination might make girls more likely to have sex*; *girls who had the HPV vaccination would be more likely to have unprotected sex.* Higher scores on these items indicated agreement with the statement. A further seven items examined attitudes to vaccination in general, assessed using the same likert scales as the HPV vaccination items, and these were *vaccinations are effective in preventing disease; I am concerned about vaccination side effects; It is very important that I receive all my vaccinations; I am afraid of needles; It is better to get the disease and get protected from it naturally than to be vaccinated; If the disease is not serious, it is not worth getting a jab to prevent it; I don't want to have too many vaccinations.* These two groups of items were recoded such that higher scores indicated more positive attitudes and reliability analyses carried out to examine whether the items formed internally consistent scales of HPV vaccination attitudes and general vaccination attitudes. These items are shown in the questionnaires used in the study in Appendix 2 (p281).

4.2.4.5. Behavioural intention responses

Intentions were measured with questions related to participation in cervical screening, HPV testing, and HPV vaccination in the future, and these were in line with the approach developed in Chapter 3 (as discussed on p104). Beavioural intentions were quantified with 4-item likert scales, labelled 'very unlikely,' 'unlikely,' 'likely' and 'very likely' (*When you are older and are invited for a smear test, how likely is it that you will go; If you were offered a test for HPV in the future, how likely is it that you would have one; If you were invited to have HPV vaccination, how likely would you be to have it?).* Intentions on these three behaviours were chosen to reflect practical behavioural outcomes of information provision, and given the specificity of these anticipated behaviours the items used were novel. These items are again shown in the questionnaires used in the study in Appendix 2 (p281).

4.2.5. Procedure

Participants were randomly allocated via computer generated list order to receive information on HPV, Chlamydia or environmental information. Data were collected in supervised classroom settings. Students were told they would be given a leaflet to read, which may or may not contain information on cancer or sexually transmitted infections (STIs). Around five minutes were given for information exposure, after which the leaflets were collected. Students were then given questionnaires to complete containing the study's quantitative measures. Supervision ensured that no discussion took place during exposure or completion of the questionnaires.

4.2.6. Statistical methods and analysis

Psychometric scores were compared using between subjects analyses of variance (ANOVA), with three levels of information condition. Planned comparisons compared

HPV information with Chlamydia and environmental control information, and Chlamydia with environmental information where specified in hypotheses. Reliability analyses were also performed on the two scales of vaccination-related attitudes.

Mediation effects of knowledge were also examined using the methods outlined by Preacher and Hayes (2008). Mediation effects are those whereby an observed relationship between an independent variable and a dependent variable can be better explained by the consideration of a third variable, which is known as a mediator variable. Preacher and Hayes (2008) state that there are three ways of reporting mediation analyses: firstly, by reporting t-tests of the individual relationships between variables and, if appropriate, of the indirect path (reflected by the β statistic). A second method is the Sobel test (reflected by the z statistic) and works well with larger samples, so is not reported here. The third method is bootstrapping analyses, and is reported via confidence intervals of the outcome; this simulates use of a larger sample and so is appropriate with the relatively small numbers of participants in this study.

4.3. Results

4.3.1. Participation rates

Out of 175 students present on the day of testing, only one opted out of participation.

4.3.2. Hypothesis 1: Knowledge

It was hypothesised that participants given HPV information would show higher knowledge on the topic of HPV than those given other forms of information.

Reliability estimations were carried out across all participants, and a Cronbach's alpha of .86 obtained. Participants in the control groups obtained an average of 5.91 correct answers on the HPV knowledge scale, compared to 10.22 correct answers in the HPV

information group (see Table 4, p119). The between-group differences were significant, $F(2, 171) = 31.18$, $p < .01$, and planned comparisons showed higher scores in the HPV information group than either the Chlamydia, $F(1, 171) = 50.87$, $p < .01$, or environmental, $F(1, 171) = 41.84$, $p < .01$, groups (but not between the Chlamydia and environmental groups: $F(1, 171) = .96$, $p = .46$, demonstrating that participants read and attended to the HPV information.

4.3.3. Hypothesis 2: Affect

It was hypothesised that participants presented with HPV information would show more negative affect than those presented with Chlamydia or environmental information, and those presented with Chlamydia information would show more negative affect than those presented with environmental information.

See Table 4 (p119) for a summary of affective response by information condition. The mean score on the STAI in the HPV information group was 11.73 compared with 11.21 for the Chlamydia and 11.10 for the environmental information groups. These differences were not statistically significant. $F(2, 166) = .54$, $p = .59$; there was therefore no evidence that HPV information increased anxiety, or indeed that anxiety levels were sensitive to differences between the provided information sources. Anxiety among the sample who read the HPV leaflet was slightly higher than the prorated population of norm of 10.50, but did not approach the norm for women with anxiety disorders (of approximately 15).

Table 4. Knowledge and affective responses by information condition.

	Group			
	HPV [a] n = 59 mean (sd)	Chlamydia [b] n = 59 mean (sd)	Environmental c n = 56 mean (sd)	F (p-value)
Knowledge (scale range: 0 to 14)				
HPV Knowledge score	10.18 (3.88) [ab]	6.13 (3.88)	5.66 (3.22)	31.18 (<.01)
Affective responses (scale range: 6 to 24)				
STAI (anxiety)	11.73 (3.07)	11.21 (3.33)	11.19 (3.05)	0.57 (.59)

Subscript indicates significant differences with indicated group.

4.3.4. Hypothesis 3: Evaluative responses

It was hypothesised that HPV information would be evaluated more negatively than Chlamydia or environmental information, and Chlamydia information would be evaluated more negatively than environmental information.

See Table 5 (p120) for a summary of evaluative responses. In terms of 'reassuring' content, significant overall differences were observed between the three groups, $F(2, 168) = 6.95$, $p < .01$, and here planned comparisons indicated that the HPV information was rated as more reassuring than environmental, $F(1, 168) = 11.90$, $p < .01$, but did not differ from Chlamydia information, $F(1, 168) = .04$, $p = .84$. Chlamydia information was also rated as more reassuring than environmental information, $t(1, 168) = 13.47$, $p. < .01$. HPV information was rated as significantly more 'scary' than environmental, $F(1, 170) = 7.51$, $p < .01$, but not than Chlamydia, $F(1, 170) = .16$, $p = .69$, with a significant overall effect shown, $F(1, 168) = .04$, $p < .01$. In addition, Chlamydia information was rated as more scary than environmental information, $t(1, 170) = 12.74$, $p. < .01$. There were also significant group differences in ratings of the information as 'interesting', $F(2, 170) = 4.38$, $p < .01$. However planned comparisons revealed that differences between HPV information was rated as more interesting than environmental information, $F(1, 170) = 4.89$, $p = .03$, but not than Chlamydia information, $F(1, 170) = .36$, $p = .55$. As with the other items, Chlamydia information was again rated as more interesting than environmental information, $F(1, 170) = 7.95$, $p. < .01$.

Table 5. Evaluative responses by information condition.

	Group			
	HPV [a] n = 59	Chlamydia [b] n = 59	Environmental [c] n = 56	
Evaluative item	mean (sd)	mean (sd)	mean (sd)	F (p-value)
Interesting	3.09 (.80) [c]	3.19 (.88) [c]	2.71 (1.00)	4.38 (.01)
Scary	2.52 (.80) [c]	2.66 (.99) [c]	2.04 (.95)	8.45 (<.01)
Reassuring	2.96 (.98) [c]	3.00 (.97) [c]	2.36 (.84)	6.95 (<.01)

Superscript indicates significant difference with indicated group

Similar numbers of respondents judged the amount of information as 'about right' (88 % for HPV information, compared with 85% and 77% for Chlamydia and environmental groups respectively). 3% of participants in the HPV group (and 5% in the Chlamydia group) judged it 'too much,' compared with 18% in the environmental group. Nearly half (42%) of participants in the HPV group wanted to read more on the subject, compared with 31% given Chlamydia information and 27% given environmental information, X^2 (1) = 6.23, p = .01.

4.3.5. Hypothesis 4: Attitudinal responses

It was hypothesised that participants presented with HPV information would show significantly more negative attitudes to cancer than those given Chlamydia or environmental information, and those presented with Chlamydia information would show more negative attitudes than those presented with environmental information.

Measures assessed general vaccination-related attitudes and HPV-specific vaccination attitudes, and reliability analyses were carried out on these two groups of items. With items in both recoded to reflect positive attitudes towards vaccination, a Cronbach's alpha statistic of .67 was shown for HPV vaccination attitudes, and .36 for general vaccination attitudes. This suggested minimally adequate internal consistency in the HPV vaccination scale, and inadequate consistency in the vaccination items scale; accordingly, items in the latter scale were analysed separately.

As is shown in Table 6 (p122), few effects of information condition on attitudes were shown. The HPV vaccination scale showed no differences by information condition, F (1, 168) = 1.16, p = .33, and none of the general vaccination attitude items showed differences by information condition.

Table 6. Attitudinal responses by information condition.

	Group			
	HPV	Chlamydia	Environmental	
	n = 59	n = 59	n = 56	
	mean (sd)	mean (sd)	mean (sd)	F (p-value)
HPV vaccination scale (range 6-24)	18.0 (2.41)	18.17 (2.29)	17.54 (2.21)	1.26 (.33)
I would want to be on the safe side and have the HPV vaccination	3.27 (.67)	3.34 (.58)	3.22 (.57)	.62 (.54)
I would be very worried about side effects of the HPV vaccination	2.50 (.59)	2.35 (.72)	2.50 (.74)	.89 (.41)
Having the vaccination would be a good way to protect myself against cervical cancer	3.24 (.60)	3.25 (.52)	3.08 (.55)	1.52 (.22)
Having the vaccination would be a good way to protect myself from HPV	3.20 (.52)	3.38 (.49)	3.14 (.48)	3.61 (.03)
Having the HPV vaccination might make girls more likely to have sex	2.08 (.71)	2.31 (.75)	2.20 (.73)	1.36 (.26)
Girls who had the HPV vaccination would be more likely to have unprotected sex	2.10 (.69)	2.15 (.72)	2.10 (.66)	.49 (.61)
Vaccinations are effective in preventing disease	3.80 (.66)	3.22 (.42)	3.19 (.55)	1.32 (.27)
I am concerned about vaccination side effects	2.48 (.69)	2.78 (.67)	2.57 (.78)	2.63 (.08)
It is very important that I receive all my vaccinations	3.16 (.65)	3.13 (.54)	3.10 (.68)	.10 (.90)
I am afraid of needles	2.48 (1.03)	2.49 (1.19)	2.51 (1.12)	.02 (.99)
It is better to get the disease and get protected from it naturally than to be vaccinated	3.20 (.80)	3.33 (.68)	3.16 (.81)	.84 (.43)
If the disease is not serious, it is not worth getting a jab to prevent it	3.00 (.76)	3.18 (.62)	3.03 (.72)	1.14 (.32)
I don't want to have too many vaccinations	2.42 (.87)	2.59 (.74)	2.29 (.84)	1.87 (.15)

4.3.6. Hypothesis 5: Behavioural intention responses.

It was hypothesised that presentation of HPV information would result in lower behavioural intentions in relation to screening than Chlamydia or environmental information, and Chlamydia information would result in lower intentions than those presented with environmental information.

See Table 7 (p123) for a summary of behavioural intention responses. Overall, the students had positive intentions towards HPV testing (91% likely or very likely), vaccination (82% likely or very likely) and cervical screening (91% likely or very

likely). There were significant between-group differences in intentions to attend cervical screening, F (2, 167) = 3.12, p < .05, and accept HPV vaccination, F (2, 169) = 3.10, p < .05, but the differences in intentions to have an HPV test were not significant, F (2, 168) = 2.04, p = .09. Contrary to predictions, planned comparisons showed that exposure to HPV information was associated with a stronger intention to accept HPV vaccination than exposure to environmental information, F (2, 169) = 5.64, p = .02, but the effect did not reach significance compared with Chlamydia information, F (2, 169) = 3.33, p = .07. There were no significant differences between the Chlyamdia and environmental information groups in terms of HPV vaccination intentions, F (1, 169) = .32, p. = .57. Intentions to attend cervical screening revealed a similar pattern: the HPV group had stronger intentions than the environmental group, F (2, 167) = 4.82, p = .03, but not the Chlamydia group, F (2, 167) = 0.01, p = .92. The Chlamydia information group also showed higher screening attendance intentions than the environmental group, F (1, 167) = 4.80, p. = .03.

Table 7. Behavioural intention responses by information condition.

	Group			
	HPV [a]	Chlamydia [b]	Environmental [c]	
	n = 59	n = 59	n = 56	
	mean (sd)	mean (sd)	mean (sd)	F (p-value)
Behavioural intention responses (1 to 4)				
Screening intention	3.44 (.66) [c]	3.42 (.65)	3.14 (.80)	3.12 (<.05)
HPV test intention	3.40 (.78)	3.41 (.59)	3.16 (.71)	2.40 (.09)
HPV vaccination intention	3.36 (.74) [c]	3.09 (.80) [c]	3.00 (.89)	3.10 (<.05)

Superscript indicates significant difference with indicated group.

4.3.7. Hypothesis 6: Mediating effects of knowledge.

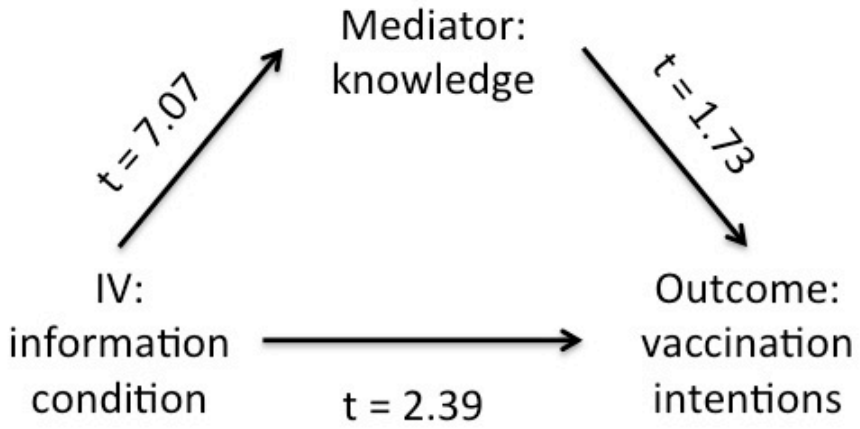
It was hypothesised that knowledge of HPV would have a significant mediating effect on any observed relationships between information condition and anxiety, and information condition and behavioural intentions.

Bootstrapping analyses were used to examine mediation effects of knowledge on anxiety and behavioural intentions; whether individuals who show differences in terms of these variables across information conditions because they had differing amounts of knowledge about HPV. All analyses reported here included a t-test of the coefficient of the IV on the outcome: there was a significant effect of the IV on the mediator (information condition to knowledge: $t = 7.07$, $p < .01$).

Given that there were no effects of the mediator (knowledge) to outcome variable – referred to as the b path by Preacher and Hayes (2004) – in terms of anxiety ($t = -.39$, $p. = .70$), HPV testing intentions ($t = 1.89$, $p. = .06$), or screening intentions ($t = .13$, $p. = .89$) these analyses were not carried out.

For the information condition to knowledge to screening intentions pathway, there were no significant effects of the IV on the outcome (information condition to vaccine intention $t = 1.81$ p - .05) or of the mediator on the outcome (knowledge to screening intentions; $t = 1.85$, $p. = .07$); again, accordingly, mediation analyses were therefore not carried out.

Figure 4. Mediation of effects on screening intentions by knowledge



For the information condition to knowledge to vaccination intention pathway, there was no significant effect of the mediator on the outcome (knowledge to vaccine intention; t

= 1.73, p. = .08) but a significant effect of the IV on the outcome (information condition to vaccine intention; t = 2.39, p. = .02). This relationship is shown in Figure 4. There was evidence of overall mediation in this analysis, with the IV-intentions association (β = .18, *p* =.02) reduced by the inclusion of knowledge (β = .11, *p* =.22). Non-significant mediation effects were demonstrated using bootstrapping analyses (5000 resamples; confidence intervals for indirect effects were -.01 and .17). However, as suggested by Preacher and Hayes (2008) the proximity of the confidence intervals to zero in the latter analysis suggests a mediation effect: a further analysis was therefore carried out using a 90% confidence level, where significant mediation effects of knowledge were demonstrated using bootstrapping (5000 resamples; confidence intervals for indirect effects were .01 and .15).

4.4. Discussion

Some, but not all, of the measures used in this study produced findings in line with earlier research, but, in general, findings disagreed with the earlier assumption that the general emotional response to HPV information would be largely negative. HPV information – along with that on Chlamydia - was rated as more 'scary' than information on the environment, but also as more interesting and reassuring. This finding fits with previous qualitative evidence of women's affective responses to HPV information in non-clinical (i.e. information provision only) contexts (as reviewed in Chapter 1, p37). The findings of Olshen et al.'s (2005) and Waller et al.'s (2006) studies revealed largely positive responses tempered by concerns over the novelty of the information, while Mays et al. (2000) and Goldsmith et al. (2007) appeared to find more broadly negative reactions to HPV information. The latter in particular revealed themes of apprehension, uncertainty and shock, which would fit with the label of 'scary' that participants applied in this study. Ramirez et al.'s (1993) survey study of predicted responses to an HPV diagnosis also fits with this interpretation, where one of the most prominent labels that participants attached to a future diagnosis was 'scared.'

A number of these previous studies can also be related to this study's findings regarding anxiety. Anxiety was used here as a measure of affective response, and no differences were shown between the three information conditions. This study's

hypotheses had predicted stronger anxiety responses in participants given HPV information, because previous research had shown such responses to diagnoses with HPV infection (as per those studies reviewed in Chapter 1, p35): e.g. McCaffery et al. (2005), Maissi et al. (2005) and McCaffery et al. (2004), but this is understandable due to the personal relevance and immediacy of a diagnostic context rather than an information provision context. One conclusion here may be that explicit responses – as examined by evaluative measures or qualitative studies – expose polarised responses to HPV information, both positive and negative; but these responses do not translate into anxiety responses (or, at least, those which are detectable by the STAI). For example, Mays et al. (2000) and Goldsmith et al. (2007), in two studies discussed earlier (see p125), had shown broadly negative reactions to HPV information; it may be that separating out anxiety and evaluative responses is useful in demonstrating whether explicit evaluations are strong enough to bring about changes in anxiety levels. Given that the means on the anxiety outcome measures were in the predicted directions however, it should also be considered whether a lack of power in the current sample meant that no significant effects were shown (though the sample size was adequate for these analyses)

Although it seems a relatively obvious finding to observe that those participants given HPV and cervical cancer information were the most knowledgeable about that topic when assessed immediately afterwards, this finding was useful in two ways. Firstly, Marteau, Dormandy and Michie (2003; see also Marteau, Dormandy and Michie, 2001)'s model of informed consent provision as covered in Chapter 2 (p48) suggested that objectively demonstrable uptake of information about the intended treatment is a necessary prerequisite for informed consent, and that here the target population for the vaccination programme is able to assimilate information about HPV and the vaccination itself. Secondly, this fits with earlier evidence suggesting that while in some cases HPV information is perceived as complex (as suggested by Waller et al's 2005 qualitative study of HPV information recipients), information recipients are able to assimilate it. The finding fits with two experimental studies of HPV knowledge uptake (discussed in Chapter 1, p40): Davis et al.'s (2004) and Dempsey et al.'s (2004) studies both showed that a short HPV information source was able to increase HPV knowledge in the short-term. Waller et al.'s (2006) qualitative focus group study also noted that mothers showed few issues in absorbing HPV information.

However Brabin et al.'s (2010) and Cooper-Robbins et al.'s (2010) studies should also be considered: in both studies, adolescent girls whohad been given information about HPV and the vaccine itself showed poor HPV knowledge some time after the event (this was at a time period of 6 months in the study by Brabin et al. and a variable time of 1-8 months in the Cooper-Robbins et al. study). How well the information was retained by participants in the present study cannot be estimated and is a significant limitation.

Measures of future behavioural intentions to receive the HPV vaccine in this study also revealed that although intentions were generally positive throughout, these intentions were boosted by the presentation of HPV-related information. However, Chlamydia information produced a similar boost, suggesting that another factor – for example, relevance of the information or its emotional or health-related content – may have caused this. This may perhaps be because the subject of STIs is of particular interest to adolescents, or because cervical screening is mistakenly perceived to be a general check for sexual health problems (including STIs). A similar pattern was observed in terms of cervical screening attendance intentions, but not HPV testing intentions. Earlier studies had shown similar results with regard to future intentions in adolescent age girls: Hoover et al. (2000) showed high predicted uptake even in the absence of adequate HPV knowledge, and Chan et al. (2009) had been able to create a measurable boost in intentions over time via presentation of an information source (see also Dempsey et al., 2006).

Knowledge mediation analyses were carried out using the techniques set out by Preacher and Hayes (2004), which permit an examination of whether a given relationship between two variables is better explained by the addition of a third mediating variable. It was noted in the introduction that little research had examined the role of knowledge as a predictor of anxiety and behavioural effects, with one study examining the relationship between HIV knowledge, stigma and willingness to disclose (Yang et al., 2006) although this study did not employ an information provision variable as did the current study. Contradicting the present study's hypotheses, knowledge of HPV/cervical cancer did not have a mediating effect on anxiety as might be expected if knowledge of HPV/cervical cancer was in itself a source of anxiety.

Furthermore, this does not support the view that knowing about HPV is itself a source of measurable anxiety, as suggested by some previous research (as discussed in section1.3.6, p35; but specifically Goldmsith et al., 2007; Mays et al., 2000; Ramirez, 1997). However this may have been because of a lack of direct effects: as is set out by Preacher and Hayes' (2004) methodology, if the information had been more anxiety-inducing, there may have been more potential for mediation to occur. There were indications that knowledge partially mediated the effects of information source condition on HPV vaccination intentions however, although only when using a 90% confidence level rather than 95%. This is a particularly reassuring finding, and in line with earlier findings shown by Chan et al. (2009), which suggests that vaccination intentions were not being only enhanced by simple exposure to relevant information but also by objectively measurable uptake of the given information, and supports the common sense view that knowing about HPV is sufficient to bring about behavioural intentions (again, see some of the evidence reviewed in section1.3.6,from p35; but specifically Goldmsith et al., 2007; Mays et al., 2000; Ramirez, 1997).

Attitudes were generally positive, and also appeared to be the most resistant to change via information provision; at least when, as in the case of this study, measured via single time-point assessment immediately following the provision of information. On one hand this seems surprising, particularly given that a number of the attitudes tested related specifically to the issue of HPV vaccination; however, it also seems reasonable to consider that attitudinal responses were the least affected by information provision in this testing paradigm. These results are in line with those of the literature review (where mixed or limited evidence for effects of information provision on related attitudes was shown) and also Dempsey et al. (2006) where HPV information was shown to have little impact on attitudinal measures.

4.4.1. Limitations.

The attitudinal measures discussed at the end of the previous section were a possible source of criticism for this study; they showed poor consistency, and assessed a diverse range of attitudes without examining basic positivity or negativity towards vaccination or HPV vaccination. The following studies in this experimental series attempt to assess

responses to the provided information using simpler measures drawn from theory. Another potentially problematic set of measures used in this study were those assessing behavioural intentions; here, an even number of response options were included on the likert scale. This has the effect of eliminating neutral responses (Garland, 1991, suggests that this may also reduce some biases, such as social desirability), but may also distort results by forcing participants to pick a response when they are not sure. This decision will be reassessed in the following study.

This study may also be criticised over the selection of Chlamydia as a control condition. As was stated at the outset of this chapter, the purpose of using Chlamydia as a control source was as a condition also containing sexual health information, but no connection with cancer; however, studies have shown particularly high threat perceptions about Chlamydia, representing a possible confound that should be addressed in subsequent studies. A review of 25 eligible studies by Pavlin et al. (2006) identified fear, anxiety and stigma surrounding the condition as main themes, as well as emphasising the complexity of the information itself and of the subsequent emotional elements of infection, particularly the possibility of future infertility. It should noted that although these concerns of emotional complexity, fear and anxiety are also found throughout the equivalent literature in HPV, unfortunately no studies could be identified which directly compared the magnitude of negative emotional responses across the two conditions. Three studies (Blake et al., 2003a; Ford et al., 2004b; Duncan et al., 2001b) highlighted anxiety as a major issue in learning about Chlamydia, although in most cases these themes overlapped with concerns about future reproductive issues. Again findings were demonstrated resembling those in the HPV literature in a number of studies with respect to inaccurate knowledge as a barrier to preventative action (Blake et al., 2003b; Ford et al., 2004a; Henning et al., 2007; Santer et al., 2003; Christianson et al., 2003); in these cases participants were unlikely to accept screening because they did not know enough about Chlamydia or the screen itself. Balfe et al.'s (2010) qualitative assessment of barriers to Chlamydia screening in the Republic of Ireland highlighted the role of stigma, and it is possible that this may represent an important difference between Chlamydia and HPV despite their similar characteristics; Chlamydia, as a more established health issue, may have had more time to accrue stigmatism. This represents a question to be answered by future stigma research rather than the present experimental series however. These issues mean that

the focus of the health-related control used in this study was strongly on sexual transmission, with the implication that the adolescent sample used appeared to be more concerned with this aspect of the information than the opportunity for cancer prevention. One solution to these issues may be to use an alternative topic as a control information source in the later studies in this series, that attempts to control for the presence of cancer information rather than sexual transmission information.

A further limitation in the design of this study is that measures were only taken at a single time point; that is, immediately following presentation of information materials. For this reason, baseline knowledge and attitudes represent a possible confound in the present study. As was noted during the review of relevant literature in Chapter 3, one useful alternative method would be to record baseline measurements before presentation of information and compare these with one or more post-information measurements. Indeed this approach was used to examine responses to HPV information materials by Chan et al. (2009). This approach was not practical in the current study's school setting with only limited time allocated for the study procedure. There is also the possibility that presentation of information materials followed by immediate measurement of responses may produce subjective biases; our main comparisons, however, are made between control and experimental intervention groups (which should share any such biases), and immediate reactions to the presented information are in fact our primary focus (as per findings in the earlier qualitative literature).

In this chapter an experimental method for examining emotional, cognitive and behavioural reactions to health information has been presented. Young women were able to understand and assimilate detailed HPV information without showing increased levels of anxiety, and with even minimal information, enthusiasm for vaccination was high. Results appeared to conflict with previous findings showing negative emotional responses to HPV information however. It appeared from these results, then, that young women could effectively utilise a short print information source to absorb information about HPV and HPV vaccination, and that the topic does not necessarily invoke negative affect in these individuals. It seems appropriate, then, to suggest that obtaining informed consent is at least a reasonable prospect in those individuals targeted by the vaccination programme, and that this should be possible without making

a significant impact upon uptake rates. Although the classroom setting in which the research was conducted made it possible to collect data from a large number of participants in a short space of time, it also brought drawbacks with respect to the measures that could obtained. Using a similar testing method in a more controlled experimental setting may mean that many of this study's shortcomings could be addressed, including the addition of several design properties and measures that were noted in the closing comments of the review chapter, including repeated-measures components and tests of implicit associations. It would also provide the opportunity to examine whether the absence of those negative emotional responses shown by earlier studies was specific to the sample and methods used in this study.

5. Implicit and explicit reactions to information on cancer

5.1. Introduction

The study of adolescents presented in the previous chapter had a number of limitations including lack of control in the experimental setting, a lack of baseline measures and a dependency on self-report measures. Use of only post-exposure measures, though efficient in terms of data collection unfortunately also meant that baseline knowledge and attitudes became a potential confound. As discussed in the review of print-evaluation literature in Chapter 3 (p81), one of the goals of this experimental series was to utilise more objective types of measure and move away from the sole use of self-report.

The research presented in this chapter attempted to address these issues maintaining a similar experimental approach using a broad range of measures, but via a series of one-on-one sessions with participants rather than an open classroom setting, to measure responses at baseline and post-exposure (as per the study of HPV information uptake by Chan et al., 2009), and to include performance-based variables as well as those involving subjective self-report and improved control information materials. The previous study aimed to examine negative affect in participants given HPV information, and to test for a range of associated negative psychological and behavioural responses on other measures, but did not show strong negative affective responses overall; the present study inherits these aims and hypotheses, though examines them using an improved research design and setting. This change in setting also permits the inclusion of a greater number of measures due to the increased time spent with each participant. In contrast with earlier qualitative findings (e.g. McCaffery et al, 2004; see section 1.3.6, p35), the previous study showed little evidence of increased negative affect in response to HPV information among adolescent-age participants; the present study examines whether this finding also applies to an older sample. Furthermore, though previous evidence showed primarily negative responses to HPV information (see summary on p43), in certain circumstances more positive responses were shown. In the present study an instrument – the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988b) - is included which assesses both

positive and negative affect, as identified in in Chapter 3's literature review (specifically see p103). Attitudinal measures were not included in this study however due to the lack of effects in the previous study and the low internal reliability shown in those items.

One recurrent theme across the selection of theory reviewed in Chapter 2, both in implicit measures (p49) and fear appeals research (p69), was the possible dual impact of affective processes and more cognitive or analytical processes in determining psychological response and subsequent behaviour (e.g. Evans et al., 2007; see discussion, p49). The present study therefore aimed to consider responses to health information in terms of both implicit associations and more explicit responses such as behaviour and content evaluation (as with the previous study). While there is a body of research that has examined associations between implicit measures and behaviours (e.g. Greenwald et al.'s 2009 meta-analysis of the predictive validity of implicit measures, as discussed on p58; see p58 for other studies assessing predictive validity and p60 for other uses in healthcare research) there is no precedent for the use of implicit measures to assess responses to health information. Given that previous qualitative and quantitative studies have demonstrated individuals reporting negative emotional responses to HPV information, it is expected that implicit measures will reflect these negative responses.

Concerns about the use of Chylamydia as a control condition were also raised in the previous chapter. The purpose of using a health-related control information leaflet was to control for the presence of affective health information, which was assumed to also be present in the HPV information, but in the absence of one of the unique properties of HPV information (that is, the link between an STI and a cancer). However, using Chlamydia as a control topic placed the focus of the comparison on the fact that the source of affect in both was sexual transmission, and previous research indicates that Chlamydia appears to have strong negative connotations in this regard. For example, Balfe et al.'s (2010) study of barriers to Chlamydia screening participation demonstrates the stigma attached to the infection, and this is supported by a number of studies showing stigmatised responses in those diagnosed with Chlamydia; e.g. Mills et al.'s (2006) interview study of 45 recently diagnosed individuals, and Duncan et al.'s (2001a) qualitative study with semi-structured interviews with 17 women with a current

or recent infection (see p129 for a fuller discussion). In the present study, it was considered that a more relevant comparison would be one that controlled for the presence of cancer information in the absence of sexual transmission information, because one of the key issues in informing women about HPV appears to be the notion of a sexually transmitted cancer (as is suggested in the studies reviewed in chapter 1, p43). Use of Chlamydia as a control topic was abandoned and replaced with breast cancer in order to fulfil this purpose, with environmental information retained as a non-health related control. The present study therefore had three conditions, two of which contained cancer information, and one of which did not; of the two containing cancer information, only one contains sexual transmission information. In line with the literature reviewed in Chapter 1 where the sexual transmission aspect of HPV information was identified as a particularly difficult aspect of the information, this study predicts a greater negative impact of the two cancer-related information leaflets, but that the HPV information will have the strongest impact of all due to the presence of sexual transmission and cancer information. It is predicted that this pattern should emerge in implicit measures, and according to the theory reviewed in Chapter 2 relating to the importance of automatic implicit associations in determining general evaluative responses (see from p49), should also be reflected across explicit evaluative measures.

The results of the classroom-based study replicated earlier research (as reviewed in Chapter 1; see from p37) showing negative explicit responses to HPV information; however the link between an STI and cancer did not appear to have an impact over and above that of STI information alone, with no differences shown between the two health-related groups on any of three explicit content evaluation items. In all cases, the two groups did differ from the environmental control leaflet however. (Again, as with earlier research, not all of the responses shown to HPV information were negative; HPV information was also rated as more reassuring than other forms of information.) Similar patterns were shown with behavioural responses: both cervical screening and HPV vaccination intentions were higher in the HPV and Chlamydia information groups, but the HPV information group did not show higher intentions than the Chlamydia group. There were also negligible effects in terms of explicit attitudes and affective responses across the three leaflet groups. It remains to be seen whether these effects will be shown in an older sample to the previous study on those items that are

maintained, and when cancer information – rather than sexual transmission information – is controlled for.

5.1.1 Aims

In the design of the present study, longitudinal changes in IAT responses to cancer-related stimuli were assessed before and after presentation of information, and it was determined whether these changes depend upon the type of presented information (HPV-related versus controls). Because the present study uses a different sample and control condition (breast cancer rather than Chlamydia information) the hypotheses of the classroom-based study in the previous chapter are maintained (p112), based on the evidence presented in the first chapter. More negative emotional responses are predicted to HPV information as compared to breast cancer or environmental information, with a single-category implicit measure of cancer assocations (the methodology of which is covered in Chapter 2, p64) employed to assess affective responses without using self-report methods. This implicit measure is also examined as both outcome and predictor, as existing evidence has shown that implicit associations can predict behaviours and other variables (see those studies discussed in Chapter 2, p58). As with the previous study, it is predicted that HPV information will be associated with the most negative responses due to the presence of both cancer and sexual transmission information; breast cancer will be evaluated less negatively than HPV information but more negatively than environmental information due to the presence of cancer information.

5.1.2. Hypotheses.

1. It was hypothesised that participants given HPV information would show higher levels of knowledge on the topic of HPV than those given other forms of information.
2. It was hypothesised that participants presented with HPV information would show more negative affect and become more negative over time when presented with HPV information as compared to breast cancer or environmental information, with those

presented with breast cancer information becoming more negative than those given environmental information.

3. It was hypothesised that HPV information would be explicitly evaluated more negatively than other forms of information, and breast cancer information evaluated more negatively than environmental information.

4. It was hypothesised that implicit cancer associations would become more negative over time in the HPV information condition compared to the breast cancer or environmental information conditions, and the breast cancer condition more negative than the environmental condition.

5. It was hypothesised that those presented with HPV information would show lower intentions towards cervical screening, HPV vaccination and HPV testing than those presented with other forms of information, and those presented with breast cancer information would show lower intentions than those given environmental information.

5.2. Methods

5.2.1. Participants

Ethical approval for the study was obtained from the UCL Research Ethics Committee (see Appendix 16, p366). Information on a study of 'attitudes to health information' was distributed by email to students at a London university and volunteers were invited to register their interest in participating. Eligible respondents were selected on the basis of being female, speaking English as their first language, and not having heard of HPV. Given that the main innovation of the study was the use of the IAT measure, prospective sample sizes were calculated on this outcome using a within-between interaction analysis with two observations of the within subjects factor and three of the between. Previous uses of the IAT have shown that better effect sizes (see Chapter 2's review of implicit measures; see from p55) are one of the key advantages of using the task over other implicit measures; it was estimated that a sample size of 66 participants would permit detection of medium effect-size interactions between three levels of a single independent variable and repeated administrations of the IAT measure (95% CI), although a slightly larger sample was eventually tested.

5.2.2. Materials

As in the previous study, HPV/cervical cancer information was compared with two other forms of information as controls. One was on a more established cancer theme (breast cancer) and was intended to control for inclusion of cancer information without the issue of sexually transmitted infection. A second controlled for simple exposure to information aimed at the public (home waste, recycling and the environment). The HPV and environmental control information conditions were the same as those used in the previous study (see p114). The breast cancer information was a widely available leaflet produced by Cancer Research UK (2004), and contained the following subheadings: 'Breast cancer facts', 'How common is it', 'What is breast cancer', 'What affects your risk?', 'Screening', 'Early detection saves lives', 'What changes should I look for?' and 'Further information.' Like the HPV and environmental leaflets, the breast cancer information leaflet was also in colour and in folded leaflet format, including a number of images. However the leaflet itself was slightly longer overall than the other forms of information, at eight folded sides rather than six.

5.2.3. Design.

A mixed design was employed, with three levels of the between subjects independent variable of information type provided, and two levels of the repeat measures variable of time point. The between subjects variable was operationalised by placing participants placed into one of three conditions, receiving one of the three information leaflets. Assignment to these conditions was random based on a computer-generated random allocation list. The repeat measures variable was operationalised by presenting a subset of measures before and after presentation of the information source. A range of dependent variables were used, and these were split into the five groups described in section 5.2.5, and of these, the measures of affect, implicit assocations and behavioural intentions were administered as repeat measures.

5.2.4. Measures

5.2.4.1. Knowledge of HPV

The 15-item knowledge scale used in the former classroom-based study (see p115 for previous use in this experimental series; see p104 for identification of relevant literature) was again here used to assess HPV knowledge. Knowledge was measured at post-test only. This scale is shown in the context of the questionnaire used for the study in Appendix 4 (p292).

5.2.4.2. Affective states

The 6-item version of the State-Trait Anxiety Inventory (Marteau & Bekker, 1992; Spielberger, 1983) was used to assess anxiety, as in the previous study (p115). Positive and negative affective states were assessed with the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), as described in Chapter 3's review of measures (p103). That PANAS asks participants to match words to their current mood, with each assessed via a five-item likert scale labelled 'very slightly or not at all,' 'a little,' 'moderately,' 'quite a bit,' and 'extremely.' Examples of the items are *alert, excited, stressed* and *hostile*. 20 items are presented in total, 10 of which are negative and 10 positive. Both the STAI and PANAS were administered at both pre and post-test, and are shown in Appendix 4 (p292).

5.2.4.3. Implicit associations

The methodology of the SC-IAT was covered in Chapter 2 (p64). However an implicit measure assessing implicit cancer associations had not been used in any known existing research findings to date, and it was therefore necessary to create a pool of stimulus items. Three 10-item pools of single-word stimuli were built to reflect the conceptual

target category (*cancer*), the positive evaluative category (*funny*), and the negative evaluative category (*scary*), using a process of independent generation and verification (see Appendix 10, p353). A snowballing method was used to canvas responses to a short questionnaire in which respondents were asked to list as many words as possible that were associated with the category words of *scary*, *funny* and *cancer*. Results were obtained from 23 anonymous respondents, and lists drawn up containing each of the unique items listed. Further snowballing was then used to circulate a second survey which asked respondents to rate how closely each item represented the stated target category in order to ascertain which items provided the closest association with the appropriate category; for example, items generated under the category *scary* were rated as to how closely they represented the category *scary*. (Items included in this second stage were checked to ensure no items entered the evaluative categories which might be confused with the cancer items; for example, that no cancer-related words entered the *scary* category. No entries were omitted on this basis however.) Results for this stage were obtained from 26 anonymous respondents. The items with the highest ratings were then entered into the stimulus pool.

Throughout the task, one response key was used to indicate two of these categories, while the other was used to indicate a single category. Of the 192 trials in each task, half placed *scary* and *cancer* on the same response key (target-negative trials) and the other half of trials placed *funny* and *cancer* on the same response key (target-positive trials). Software was created using Microsoft Visual Basic Express (Microsoft, 2006), and the task was presented using the entire 13.5" screen area of a laptop computer. Participants completed a practice trial block providing training for the task itself as well as ensuring the correct categorisation responses for the items used. Screenshots of the tasks are provided in Appendix 17 (p367). Implicit measures were administered at both pre and post-test.

5.2.4.4. Content evaluations

Questions were devised to assess explicit content evaluations of the materials, and these were the same as those used in the previous study (see p115), with the exception that the term *scary* in the former study was replaced with *frightening* to avoid confusion

with the items in the implicit measures. This scale is shown in the context of the questionnaire used for the study in Appendix 4 (p292). These items included ratings of the information on dimensions of *reassuring, frightening*, and *interesting* using 5-point likert scales labelled from 'not at all' to 'very much so.' The HPV group was also asked about the amount of content in the information that they received ('too much', 'about right', 'too little') and their intention to seek further information about HPV (using the 5-point likert scale employed with the other content evaluation items). Content evaluations were assessed post-information exposure.

5.2.4.5. Behavioural intentions.

Items assessing behavioural intentions were similar to those used in the classroom-based study (see p117), only differing from those used previously by being phrased as suitable for adult women. Intentions to accept cervical screening, HPV testing or HPV vaccination (if offered) within the next 3 months, were assessed pre and post-information exposure with the following prompts: *if you were offered a smear test in the next 3 months, how likely is it that you would have the test; if you were offered a test for HPV in the next 3 months how likely is it that you would have the test; if you were invited to have an HPV vaccination in the next 3 months how likely would you be to have the vaccination*? These questions were asked to all participants; including those not given HPV information. Intentions were measured using likert scales (as in the previous study) with 7 increments labelled from 'very unlikely' at the low end of the scale to 'very likely' at the high end. The number of increments on the scale was increased from the previous study for use with the older sample of participants. For the purposes of descriptive analyses only, the three points above the mid-point were assumed to represent a positive intention. This scale is shown in the context of the questionnaire used for the study in Appendix 4 (p292).

5.2.5. Procedure

Participants were randomly assigned to one of the three conditions, using equal blocked allocations, to determine the type of information to be presented (HPV, breast cancer, environmental). The session was in three phases: pre-test, exposure to information, and post-test. Testing was carried out individually in a single session, in a quiet testing room. Participants were instructed that the session would involve completing a number of questionnaires and two computer tasks related to cancer[3]. The 'pre-test' measures included the implicit task and standardised measures of affect. Participants were then informed that there would be a short break from testing and were provided with information to read (the 'information exposure' phase). Following exposure, the experimenter administered the 'post-test' measures (the second implicit task, repeat of standardised measures of affect, and explicit evaluation of the materials). Participants also completed measures of knowledge of HPV and behavioural intentions towards HPV testing, HPV vaccination and cervical screening in the post-information phase.

5.2.6. Statistical methods and analysis.

Measures that were administered as a single time point only were analysed using single factor ANOVA. Measures administered at both baseline and post-information were examined using mixed-design analyses of variance (ANOVA) including repeated (2 levels of time of measurement) and between-group (3 levels of information condition) factors. Planned comparisons were used to examine differences between the HPV and two control conditions, and between the breast cancer and environmental conditions where specified.

[3]From an ethical standpoint it was necessary to inform participants that cancer-related information may be provided over the course of the study in the event that any would wish to decline participation (although none did).

5.3. Results

5.3.1. Hypothesis 1: Knowledge.

It was hypothesised that participants given HPV information would show higher levels of knowledge on the topic of HPV than those given other forms of information.

Reliability estimations were first carried out across all participants, and a Cronbach's alpha of .92 obtained. Following exposure, there were significant group differences in HPV knowledge, $F(2, 96) = 42.95$, $p < .01$; with the group given HPV information scoring higher than either the control, $F(1, 96) = 8.34$, $p < .01$, or the breast cancer, $F(1,96) = 9.58$, $p < .01$, groups. The HPV group attained an average score of 12.40, compared with scores of 5.61 and 5.23 for the environmental and breast cancer groups.

5.3.2. Hypothesis 2: Affective responses.

It was hypothesised that participants presented with HPV information would show more negative affect and become more negative over time when presented with HPV information as compared to breast cancer or environmental information, with those presented with breast cancer information becoming more negative than those given environmental information.

Analyses of affective reactions (the PANAS and STAI scales) at baseline and post-information are summarised in Table 8 (p143). Single-factor analyses of variance examining three levels of information condition were carried out on the STAI and PANAS scales at both pre and post-information time points, indicating successful randomisation at pre-test, and no effects of information condition at post-test.

Table 8. Affective responses by information condition.

		Environmental information		Breast cancer information		HPV information		Between groups	
Scale		Mean	SE	Mean	SE	Mean	SE	F Values (df)	P values
Positive PANAS	Range 5 to 50								
	Pre-information	28.44	1.33	24.42	1.26	28.27 b	1.08	3.40 (2, 95)	.05
	Post-information	27.00	1.50	23.66	1.26	27.36 b	1.11	2.45 (2, 95)	.10
Negative PANAS	Range 5 to 50								
	Pre-information	12.88	0.92	12.12	0.51	13.50	1.06	.66 (2, 95)	.52
	Post-information	13.00	0.90	12.13	0.50	13.30	0.82	.63 (2, 95	.54
STAI	Range 6 to 24								
	Pre-information	10.06	0.67	10.21	0.54	10.67	0.75	.22 (2, 95)	.80
	Post-information	10.91	0.65	11.03	0.53	11.86	0.75	.63 (2, 95)	.53

Repeated measures ANOVAs were also carried out on these outcomes measures, examining the within-group variable of time (pre-test, post-test) and the between-group three-level variable of information condition. For the negative subscale of the PANAS no main effects or interactions showed significant differences; that is, by time, $F(1, 90) = .01$, $p = .87$; information condition, $F(2, 90) = .63$, $p = .54$; or time by information condition, $F(2, 90) = .19$, $p = .83$.

With respect to the STAI, group means indicated that the sample showed slightly lower anxiety scores at baseline when compared to the prorated population of norm of 10.50, and did not approach the norm for women with anxiety disorders (of approximately 15). A significant main effect of time was observed, $F(1, 90) = 25.78$, $p < .01$; with participants showing higher STAI scores following information exposure. No significant effects of information condition were observed however, $F(2, 90) = .31$, $p = .73$; neither was an interaction of time by information, $F(2, 90) = 1.07$, $p = .35$. For the positive subscale of the PANAS a very similar pattern was obtained: a significant main effect of time, $F(1, 89) = 9.24$, $p < .01$, with positive affect decreasing slightly over time, but no significant effect of information condition, $F(2, 89) = 3.08$, $p = .05$, or time by information condition interaction $F(2, 89) = .42$, $p = .66$.

5.3.3. Hypothesis 3: Content evaluation responses.

It was hypothesised that HPV information would be explicitly evaluated more negatively than other forms of information, and breast cancer information evaluated more negatively than environmental information.

Subjective evaluations to the two forms of cancer information are summarised in Table 9 (p144). HPV information was rated as significantly more interesting, $F(1, 54) = 5.63$, $p < .05$, and encouraging, $F(1, 54) = 5.39$, $p < .05$, than information on breast cancer. However, it was also rated as more frightening, $F(1, 54) = 20.85$, $p < .01$.

Table 9. Content evaluation responses by information type conditions.

		Breast cancer information		HPV information		Between groups	
Evaluative terms	Range 0 to 4	Mean	SE	Mean	SE	F Values (df)	P values
Interesting	Post-information	3.46	0.15	3.86	0.09	2.81 (2, 60)	.03*
Frightening	Post-information	1.92	0.17	3.00	0.17	6.10 (2, 60)	.01*
Encouraging	Post-information	3.08	0.18	3.63	0.16	11.85 (2, 60)	.01**

* Difference is significant at <.05 level

** Difference is significant at <.01 level

Interestingly, the HPV group reported interest in obtaining more information: 73% would have liked more content in the leaflet (as opposed to less or the same) and 70% intended to find out more about HPV following the session (the other groups were not asked this question).

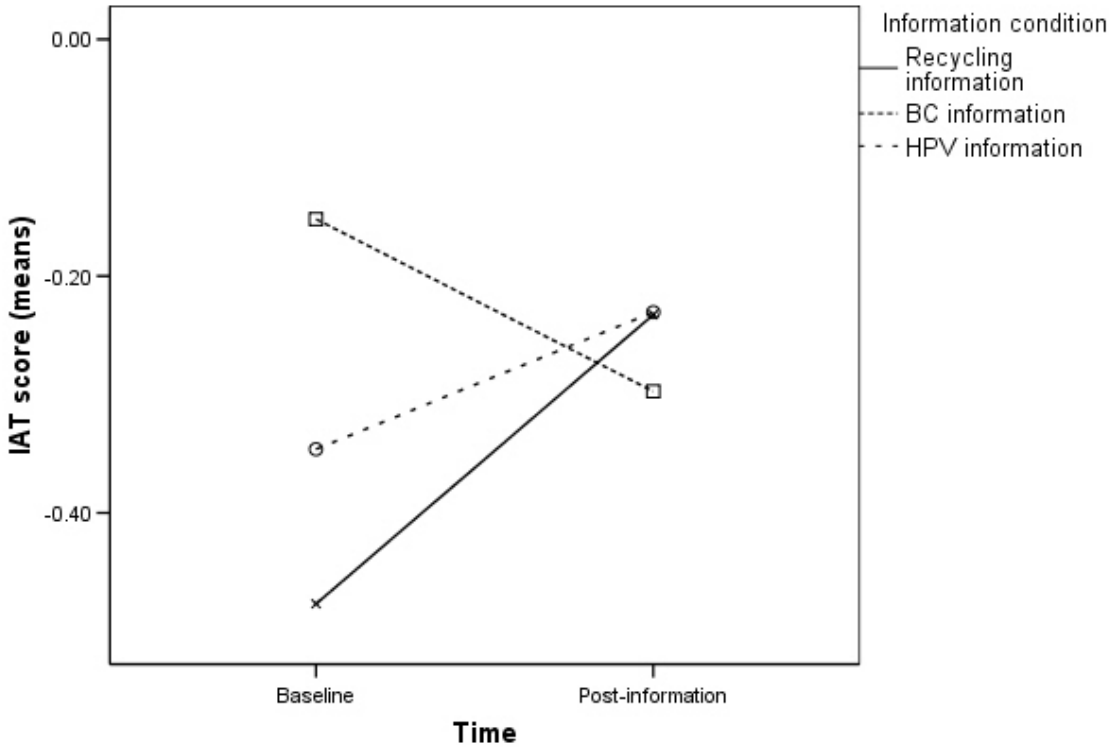
5.3.4. Hypothesis 4: Implicit associations.

It was hypothesised that implicit cancer associations would become more negative over time in the HPV information condition compared to the breast cancer or environmental

information conditions, and the breast cancer condition more negative than the environmental condition.

The *d* score (or compound) IAT outcome was considered first. A single factor ANOVA of this statistic at pre-test indicated significant differences between the three groups, $F(1, 82) = 4.86$, $p = .01$, suggesting problems in randomising participants to the three between subjects groups. Planned comparisons demonstrated that those in the breast cancer group had significantly more positive scores than those in the environmental group at baseline, $t(2, 82) = 3.05$, $p = .01$. There were however no differences between it and the HPV group, $t(2, 82) = -2.01$, $p = .05$, or the environmental and HPV groups, $t(2, 82) = .93$, $p = .36$. The primary analysis of the implicit association measure was by mixed ANOVA examining 3 levels of the between-subject variable of information condition and 2 levels of the within-subjects variable of time of measurement, with a significant interaction between information condition and time detected, $F(2, 75) = 5.30$, $p < .01$. These analyses are depicted in Figure 5 (p146); the differences between the three groups at pre-test are evident here, though the interaction effect (whereby less positive shift over time is evident in the breast cancer group than the others) can also be observed. These differences over time were examined by looking at main effects of time in each of the information groups: there was a significant increase over time in the environmental group, $F(1, 25) = 10.49$, $p < .01$, and a significant decrease over time in the breast cancer groups, $F(1, 27) = 6.59$, $p < .05$, with no significant differences over time shown in the HPV group, $F(1, 26) = 2.69$, $p = .11$.

Figure 5. IAT scores by information condition and time of measurement.



Higher IAT score indicates more positive evaluation of target concept. Interaction effect is significant at $p < .05$

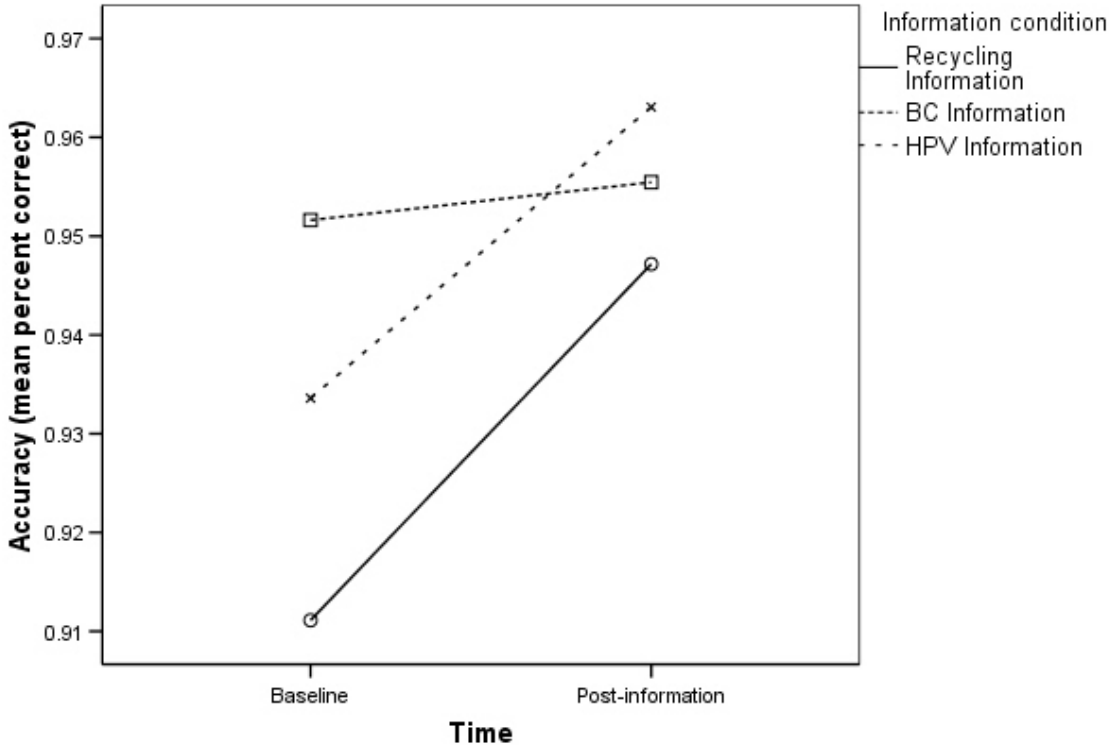
Analyses for measures of accuracy and reaction time were also split by valence-pairings (as well as information condition and time). These analyses examined whether the effects observed on the compound IAT measure could be specifically located in either target-negative or target-positive trials. Mean values for these outcomes are shown in Table 10 (p147). Target-negative trials (i.e. those where the target category of *cancer* shared a response key with the negative evaluative category of *scary*) showed no significant variation in performance across information groups. In target positive trials however (i.e. those where the target category of *cancer* shared a response key with the positive evaluative category of *funny*) there was a significant time-by-information interaction however, $F (2, 77) = 3.53$, $p = .03$; as well as a significant main effect of time, $F (1, 77) = 18.27$, $p < .01$. This analysis is shown in Figure 6 (p148). An equivalent set of analyses were carried out for reaction times, where a very similar

pattern was obtained: for target-positive trials, there was a significant interaction between time of measurement and information condition, $F(2, 77) = 3.29$, $p = .04$, and a main effect of time, $F(1, 77) = 16.20$, $p < .01$. This analysis is shown in Figure 7 (p149). No significant effects or interactions were observed in target-negative trials.

Table 10. Implicit task: mean scores on accuracy and reaction time measures split by all conditions.

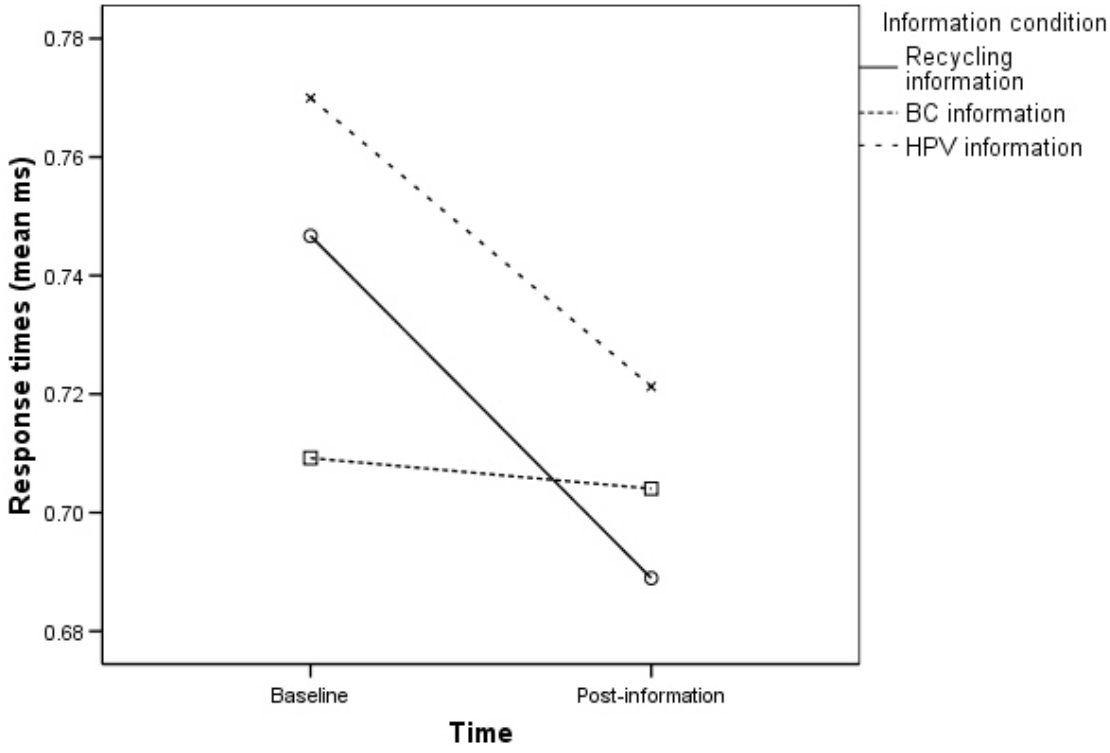
Information condition		Environmental		Breast Cancer		HPV	
	Measure	Accuracy (% correct)	Reaction time (ms)	Accuracy (% correct)	Reaction time (ms)	Accuracy (% correct)	Reaction time (ms)
Target-negative	Baseline	0.96	0.65	0.95	0.69	0.97	0.71
	Posttest	0.96	0.64	0.97	0.65	0.97	0.68
Target-positive	Baseline	0.91	0.75	0.95	0.71	0.93	0.77
	Posttest	0.95	0.69	0.95	0.7	0.96	0.74

Figure 6. Accuracy scores on IAT by information condition and time of measurement on target-positive trials.



Higher mean accuracy score indicates more positive evaluation of target concept. Interaction effect is significant at $p < .05$

Figure 7. Response times on IAT by information condition and time of measurement on target-positive trials.



Higher mean response time indicates more negative evaluation of target concept. Interaction effect is significant at $p < .05$.

5.3.5. Hypothesis 5: Behavioural intention responses.

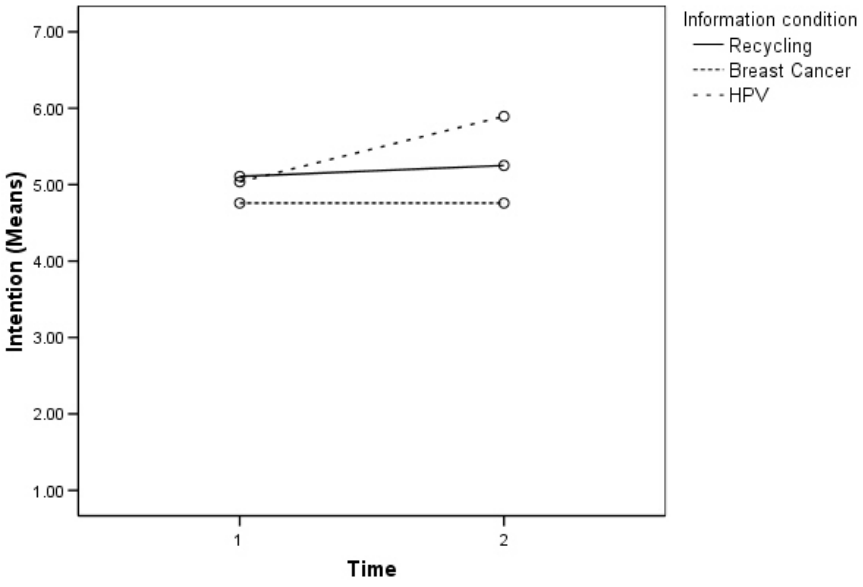
It was hypothesised that those presented with HPV information would show lower intentions towards cervical screening, HPV vaccination and HPV testing than those presented with other forms of information, and those presented with breast cancer information would show lower intentions than those given environmental information.

Intentions to attend cervical screening were assessed before and after exposure. The percentage of participants in the HPV condition who were willing to attend screening rose from 83% to 98% following information exposure, compared with fluctuations of around 3% in the environmental and breast cancer information groups. Pre-test behavioural intentions on this measure were examined via single factor ANOVA in order to check successful randomisation to information groups. No significant differences were shown between the three groups on screening intentions, $F(2, 83) = .59$, $p = .87$. A mixed between-within measures ANOVA was carried out on the pre and post information assessments of this measure, examining two levels of time and three levels of information condition. This analysis is represented in Figure 8 (p152). A significant main effect of time was observed, $F(1, 82) = 10.34$, $p < .01$; as was an interaction of time by information, $F(2, 82) = 6.52$, $p < .01$. No main effect of information condition was observed however, $F(2, 82) = .98$, $p = .38$. The interaction over time was examined by looking at main effects of time in each of the information groups: there was no significant change over time in the environmental group, $F(1, 27) = .89$, $p < .36$, or the breast cancer group, $F(1, 27) = 1.10$, $p < .38$, but a significant increase over time was shown in the HPV group, $F(1, 27) = 11.24$, $p < .01$. The increase in cervical screening intentions over time in the HPV information group may be responsible for the significant interaction effect that is shown, though this increase is not large enough to elicit a significant difference between the groups following information presentation or a main effect of information group in the interaction analysis.

Descriptive statistics suggested that the majority (83%) of participants in the HPV information condition said they would accept HPV testing, compared with 62% and 59% of participants given environmental or breast cancer information following provision of information. This measure was only administered after presentation of information. There was a significant difference between the three groups in terms of mean scores on the scale of willingness to accept an HPV test within the next three months at post-test, $F(2, 91) = 3.75$, $p < .03$. HPV information, in planned comparisons, was associated with higher willingness versus environmental information, $t(1, 91) = 1.89$, $p < .05$; and versus breast cancer information, $t(1, 91) = 2.65$, $p < .01$. Breast cancer information did not elicit significantly different responses from environmental information, however, $t(1, 91) = -.72$, $p = .48$.

Again defining 'willingness' to accept vaccination as a score above the midpoint of the scale, 83% of participants in the HPV condition were willing to accept vaccination compared with 56% and 62% of participants given environmental or breast cancer information at post-information presentation. This measure was also only administered after presentation of information. There was a significant difference between the groups in terms of mean scores on the scale of willingness to accept vaccination within the next three months at post-test, $t(2, 91) = 2.49$, $p < .01$; HPV information, in planned comparisons, was associated with higher willingness: versus environmental information, $t(1, 91) = 2.02$, $p < .05$; versus breast cancer information, $t(1, 91) = 2.68$, $p < .01$. Breast cancer information did not elicit significantly different responses from environmental information, however, $t(1, 91) = -1.28$, $p = .18$.

Figure 8. Cervical screening intentions by information condition and time of measurement.



5.4. Discussion.

This study assessed reactions to novel information on cervical cancer using implicit associations and explicitly-reported knowledge, evaluations and intentions. It included a number of the same measures as were used in the previous study reported in Chapter 4, although with some modifications. In general, similar results were shown on these measures, though with some notable differences.

In accordance with the previous study (p118) and the stated hypotheses of this study, HPV information was again shown to have a positive effect on relevant knowledge as measured by a recognition task. Interestingly this group appeared to have a similar capacity for knowledge uptake as the younger group tested in the classroom based study, suggesting that the HPV source used is suitable in both age groups in terms of its ability to impart information.

Despite the use of a broader range of measures and a repeat measures design, there still did not appear to be any differences between the information conditions in terms of anxiety responses. This replicates the finding from the previous study, and as discussed

in the previous chapter, could be considered incongruous with previous evidence on emotional responses to HPV information (see the evidence discussed on p125). (It is also possible that this result reflects the use of measures which are too general however; see limitations and recommendations discussed on p156.)

Results on evaluative measures replicated those produced by the previous study: HPV information was rated as more interesting and encouraging than information on breast cancer, but also more frightening. These findings are therefore also in line with the discussion and evidence presented in the previous chapter (p125; e.g. Mosavel & El-Shaarawi, 2007; Waller et al., 2005; Anhang et al., 2004). In this study however these results can be contrasted with implicit assessments, as discussed later in this section (p153).

Assessments of predicted behavioural response were also made before and after presentation of information. Again, similar to the previous study, presentation of information about HPV appeared to strengthen intentions to attend cervical screening and accept HPV vaccination as compared to control information sources; this is in line with the studies of Chan et al. (2009) and Dempsey et al. (2006), both of which showed a boost to HPV vaccination intentions over time (Davis et al., 2004, also showed a similar boost though using a single time point of measurement). In contrast with the previous study however, this effect also extended to HPV testing intentions, perhaps due to the present study's older sample. These findings were also reflected in repeat measures analyses. Furthermore, each of these intentions was higher in the HPV information condition in comparison to the other health-related information condition of breast cancer. This is in contrast with the previous study where the two health-related information sources appeared to strengthen behavioural intentions more than did the environmental control source.

Contrary to hypotheses, information linking cancer to an STI did not increase negative implicit associations towards cancer. It seems unlikely that this was due to ceiling effects, because analyses of main effects of time demonstrated that exposure to the breast cancer information did achieve more negative differences over time. A small number of previous studies have shown changes over time in an IAT-type paradigm in

response to exposure to relevant information: Gawronski and Lebel (2008) demonstrated the creation of new implicit associations by repeatedly pairing stimuli with positive or negatively valenced stimuli, as did Foroni and Mayr (2005), and this finding supports the suggestion that in certain contexts, implicit associations can be modified in the short term. As regards the lack of change in the HPV/vervical cancer condition, it may have been that that HPV and cervical cancer have a lesser capacity for activating existing cancer associations than breast cancer information. This may be for a number of reasons; for example, that breast cancer is a more widely publicised and common disease. Another possible factor is that the information presented contained facts about the preventability of cervical cancer, and it may be that the nature of these facts directed the specific cognitions that individuals generated in response to the material. The nature of these responses may then have served to feed back into implicitly assessed associations. This pathway of changes – that is, from explicit cognitions to automatic associations – is one of the numerous paths by which Gawronki and Bodenhausen (2006) suggest by which explicit attitude change can occur; it is not, however, considered an easy one to produce deliberately, with the authors likening it to a lengthy process of conditioning, for example in the study by Gawronski and Lebel (2008).

5.4.1. Limitations

There are a number of immediate limitations to the research. Participants in this study were recruited from a university population, and there is some evidence of a relationship between cognitive style and academic achievement (Diseth, 2003). It is therefore possible that the participants in this study analysed material in a systematic, rational way rather than responding on the basis of emotive reactions.

As mentioned previously, one significant difficulty with the IAT data presented here is that the groups differ even during the pre-information task. This may represent a methodological problem: that is, a failure to randomise information condition groups. However, the repeated measure design and analyses used served to alleviate these problems, as the primary outcomes reported were patterns of change in variance over time. It is suggested that a repeat measures design should be considered the standard

methodology when using implicit measures to examine responses to information materials. This is particularly important in cases where sample sizes in independent groups are small, because of the individual differences in performance in these measures (Greenwald et al., 2003).

Use of a medium effect size in estimating sample size may also be criticised. Firstly, the IAT measure was used to calculate sample size; however power calculations were not carried out for the variety of other measures that have been presented in this chapter. Null findings on these measures should therefore be interpreted with caution. Secondly, the basis on which an effect size convention was chosen may not have been appropriate. That earlier studies have shown large effect sizes with the use of the IAT was considered in calculating sample size. This was an oversight however: these effect sizes largely refer to within subject effects in two-category IAT tasks, and not necessarily the between-subjects manipulation of information condition used in this study. These concerns – particularly the first – could suggest that a larger sample size should have been used. In practical terms however, a larger sample size would have been difficult: with the length of time required to test a single participant, resources would not have permitted a larger sample to be obtained. It would have been necessary to employ a stopping rule if a larger sample size had been estimated (indeed, limited resources required this in later studies in any case). The emergence of a number of differences and interaction effects in these data suggested that there were discernable patterns of responding throughout, and these are carried forward and investigated in later studies: however, the problems of sample size must be kept in mind when considering null hypotheses through this entire series.

Another limitation is in terms of specifying how the three information sources used differ. This is an important issue as it determines how well the three levels of the independent variable were operationalised. The three information materials differed in terms of not only content, but also design and included images. A goal for the next study chapter is therefore to make a brief review of evidence on the effects of superficial design factors and images in health promotion materials and address the issue in terms of modifying the information sources in the study itself.

Finally, this study did not permit any comparisons between implicit measures and equivalent explicit fear measures; although explicit responses were obtained in terms of behaviour, mood and evaluation, there were no measures for assessing explicit cancer-specific responses in this study. In the introduction to this study it was discussed that attitudinal measures were not included in this study due to lack of effects and consistency in the previous study; however, measures of explicit general cancer fear may provide a superior explicit analogue to the implicit measure used here than measures of attitudes. Existing evidence suggests that implicit and explicit measures of the same concepts may differ (see Payne et al., 2008 for a review and critical discussion of these effects) and it was unfortunate that both types of measure could not be explored more thoroughly in this study. In the following study literature will be reviewed to identify existing one or more measures of explicit cancer fear and these will be used alongside the current measures.

5.4.2 Conclusion

While this study has further developed the testing method introduced in the previous study and replicated a number of findings from that study in an older sample, the predicted negative emotional responses to HPV information indicated by past research (as reviewed in Chapter 1) have not been observed. Effects have been observed in terms of a number measures however: most notably more negative emotional responses to breast cancer related information using an implicit measure. The following study will attempt to explore these findings in more detail, as well as attempt to address three main limitations: these are the poorly specified differences between the three information sources, the baseline differences between the groups on the implicit measure, and the lack of measures of explicit cancer fear.

6. Explicit fear, memory and implicit associations

6.1. Introduction

In the previous study, longitudinal changes in implicit associations with cancer stimuli were shown (p144), although these may have been the result of baseline differences and a subsequent regression to the mean rather than a genuine treatment effect. The current study attempted to replicate these longitudinal effects while better controlling for variations between the information provision conditions. Hypotheses in the present study build upon those in the previous studies; notably, whereas in the previous chapter all responses to HPV information were assumed to be negative (p135), results from both adolescents and older women showed no evidence of negative anxiety responses to HPV information. It is therefore predicted that no anxiety responses will be detected, as with the previous studies (an expanded range of measures is employed to test this prediction, however). The hypothesis from the previous study regarding negative responses to cancer-related information on implicit measures is retained however; as discussed previously, the results from the implicit measure in the previous study were largely unexpected, and the present study seeks to replicate and clarify them. The prediction of superior HPV knowledge in those participants given HPV information is also retained, given that this effect has been shown reliably in the previous studies. Following presentation of the results of this study however it may be appropriate and useful to revise these hypotheses in following studies.

A major change implemented in the present study is format of the information presentation. Although differences in psychological response were observed between the information leaflets used in the previous studies, it was difficult to pinpoint the properties of the information which brought about these differences because three entirely different leaflets were used, each with slightly varying designs and different images (as highlighted as a limitation of the previous study; see p155). Previous evidence suggests that use of images in health communication efforts can influence their impact, although much of this work has examined the impact of instructive diagrams or cartoons. Delp and Jones (1996) conducted a randomised comparison of

two health communication leaflets in 234 patients attending an emergency room, one of which included cartoon images designed to improve medication adherence while the other did not. At a three-day follow up, substantially more of those patients given images remembered all of the leaflet's content, and more reported adherence to the given advice. The boost in adherence was much smaller than the benefit to memory however. A study by Austin et al. (1995) employed a similar design with 101 patients, and used a knowledge measure as the primary outcome, finding that inclusion of imagery significantly boosted comprehension. Similar effects in similar research designs were shown by Michielutte et al. (1992) and Mansoor and Dowse (2003). Houts et al. (2006) conducted a review of imagery effects in these and other studies, concluding that the inclusion of images could improve adherence to health recommendations in certain cases, but that emotional imagery tended to exacerbate positive or negative emotional effects. Taken together, these studies suggest that imagery (particularly instructive images) can benefit memory for and recall of instructive advice, and in some cases also benefit adherence to those messages; however the role of emotional images appears to be more complex. This suggests that the inclusion of images in HPV and cancer materials may have unexpected effects.

The current study attempts to remove these possible variations: in contrast with the earlier chapters which varied not only content but overall design including imagery, here the sources used were simple text documents listing a number of bulleted information points. Only the core content of the provided information was varied in the present study's leaflets, and this was maintained from the previous study. Furthermore this core content was evaluated in a small pilot study. By reducing the differences between information conditions down to changes in core content alone, it would be possible to compare patterns of performance with those in the previous study; if similar patterns were detected, this would suggest that the responses observed resulted from the core content of the information rather than the design or images in the information sources.

Along with changes to the information materials, a further aim was to improve the range of measures employed to examine differences between information conditions. In terms of anxiety, state and trait measures were examined using the full State-Trait Anxiety Index (STAI; Marteau & Bekker, 1992; Spielberger, 1983), reflecting both

immediate affective responses to the information and trait measures of anxiety. Neither of the previous studies has shown any evidence of changes in state measures of affect in response to information provision; in the present study it is therefore presumed that similar results will be shown. Trait anxiety was introduced as a measure distinct from state anxiety in order to explain recurrent episodes of anxiety (see the methodological and conceptual definitions of the two scales set out in Spielberger, 1985). While Reiss (1997) has criticised the trait dimension of the STAI for incorporating too many overlapping conceptual components, including fear, anxiety sensitivity and trait anxiety itself, this is not necessarily problematic for the use of the scale in the current study, as a compound trait measure of these components can indicate future research. Witte and Morrison (2000) examined the role of trait anxiety in determining responses to fear appeals (e.g. the applied interventions of the EPPM discussed in Chapter 2; see p76). The authors concluded that while trait anxiety has an indirect effect on both threat and efficacy perceptions, it has no discernable impact on other outcomes such as behaviours or more general attitudes. Changes in state anxiety were considered over time and therefore measured both before and after the presentation of information; trait anxiety on the other hand was only examined once.

As was noted in the previous chapter's discussion, attitudinal measures had shown poor consistency and few responses to presented information in the first study in the present series, and were therefore not included in the second study. It was hoped however that an explicit analogue of the implicit measure of cancer fear might be used in the present study; attitudinal measures may not be appropriate to this purpose, particularly according to Eagly and Chaiken's (1993) definition of an attitude as a "psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (p1). Instead, two existing instruments were identified examining explicit cancer fear, which may provide a closer equivalent to the implicit measure used. Another more pragmatic concern behind the use of explicit cancer fear measures was their possible utility in health psychology where implicit measures are unsuitable: such measures are much easier to obtain than performance-based automatic ones, and if particular types of explicit measures can tap the same psychological constructs as implicit ones then these might be of more practical use in future studies and interventions.

The first measure of explicit cancer fear was the Breast Cancer Fear Scale developed by Champion (2004b), and this instrument was modified to reflect general cancer fear rather than breast cancer specifically for use in this study. This instrument was included as an explicit analogue of the implicit measure, and so in the current study this instrument was administered post-information to examine differences by control and experimental information sources. Champion et al. (2004) developed this instrument after observing that breast cancer fear was generally assessed using single items, and the scale has been used in a number of ethnic minority populations including African Americans (Champion et al., 2006; Russell et al., 2008) and Latinos (Larkey & Gonzalez, 2007; Larkey et al., 2009) along with low income women (Cronan et al., 2008). Talbert (2008) showed that breast cancer fear using this scale was associated with compliance with mammography recommendations. Miles et al. (2008) also used the scale as a measure of general cancer fear, showing a positive association with avoidance behaviour relating to cancer information, suggesting that those showing greater cancer fear were more likely to avoid information about cancer.

A second measure of explicit cancer fear was also used in the present study: this was the Burns Cancer Beliefs scale (Burns, 1981) which examines three subscales of fear, hopelessness and stigma. In analyses these were used as potential predictors of implicit cancer associations. The results obtained by Miles et al. (2008) suggest that cancer beliefs – in particular fear – may be associated with avoidance of relevant information, which may impact performance on the implicit task. The SC-IAT relies on monitoring fast-moving stimuli closely, and though there is no prior evidence to suggest whether performance is disrupted by emotive avoidance of the kind described by Miles et al. (2008) this possibility may be investigated.

Content evaluations in the previous studies had been operationalised by single questions assessing content in the given information. A novel semantic-differential instrument was introduced in the present study to examine content evaluations on an extended number of items. Here, responses are assessed on a dimension specified by two opposing labels (Himmelfarb, 1993; Snider & Osgood, 1969). No previous uses of a semantic-differential instrument in explicit health content evaluation context were identified in literature searches and so this use of the scale. Mean between group

differences in semantic differential items were examined in response to the information provided, and the scale was therefore given post-information.

While provision of HPV information is not designed to represent an explicit fear appeal, that it may include threat or anxiety-inducing responses is cause enough to consider it in these terms. In this study responses to fear appeals are examined with the Risk Behaviour Diagnosis Scale (RBDS), which assesses the balance of threat and efficacy information that an individual perceives in a given message according to the principles of the Extended Parallel Process Model (EPPM; see p70 for a full discussion of the EPPM and RBDS). It is possible that threat and efficacy perceptions of HPV information will reflect the complex responses typical in the qualitative literature: threat perceptions should be high given that HPV is a common infection that is linked with a severe disease, but efficacy perceptions may also be high because of the prospect of prevention. As discussed in section 2.3.2 (see p76), analytical approaches to the EPPM and RBDS observed in earlier studies are diverse; most include analyses of the variables of threat, efficacy and danger/control state as outcome variables, but also include other variables such as behaviour (for example, a common use of the EPPM is to examine where danger or control state status leads to different behavioural outcomes, as in Lavela, Smith and Weaver, 2007; other uses of the EPPM's variables as predictor outcomes are demonstrated in Barnett et al., 2009, and Roberto and Goodall, 2009). Smith et al.'s (2008) study used the model's variables in a repeated measures design, examining threat and efficacy variables before and after presentation of a single information source, showing a small but significant boost to each. The current study used a cross-sectional design but introduced a randomised control independent variable. Threat, efficacy and critical values were examined as outcome measures to study responses to the information presented, with critical values used to show whether efficacy perceptions exceed threat perceptions or vice versa. However opportunistic analyses of associations between these variables and measures of explicit affect and implicit measures were also carried out.

In addition, it is possible to look at other methods of exploring knowledge uptake; in the previous chapter concerns over the use of a purely recognition-based measure of knowledge uptake were raised. Qualitative methods (as in the studies reviewed in Chapter 1; see p35) or standardised instructions can be used to assess recall of

information; however Rothman et al. (1999) used an open-ended survey measure to examine recall of health information. This item fitted well with the design of the current study and so was used introduced to examine recall of and deliberative responses to the presented information. Predictions of outcomes on these items are not made here given a lack of earlier evidence. If differences between the three groups are observed on measures of explicit recall and deliberative thought listing, it may be that the effects obtained thus far can be explained by simple engagement effects that motivate deeper processing of material; if not, it may be assumed that the materials are having roughly equal engagement effects.

6.1.1. Aims

The research in this chapter had three broad aims: firstly, to clarify the results of the implicit test used in the previous study of university-age women; secondly, to better control for the information materials used as an independent variable; and thirdly, to improve the measures used to examine responses to materials. Where negative responses to HPV information are predicted, as with the previous classroom-based (p113) and university-age sample (p135) studies, it is again assumed that the inclusion of cancer and sexual transmission content will produce stronger responses than control information materials, and the presence of cancer information alone in the breast cancer leaflet will produce stronger responses than the environmental leaflet. The key extensions to the range of measures used relate to measures of explicit general cancer fear and evaluations, including measures of threat and efficacy perceptions and general cancer fear. A semantic differential instrument was also used to examine content evaluation responses in greater depth but predictions with this instrument are not set out due to little available previous evidence on using this type of scale to examine cancer responses. In general hypotheses are retained from the previous studies, with negative responses to cancer-related information predicted, along with greater negative affect when sexual transmission information is included.

Higher HPV knowledge recall is predicted in participants given HPV information; however predictions are not made at this stage on the open-ended measures of recall

due to little earlier evidence. Previous studies in this series showed no effects of information presentation on explicit affective state responses: in a change from the hypotheses of the previous studies, it is therefore predicted that no differences between affective response will be shown. The general hypothesis from the previous study regarding negative responses to cancer-related information on implicit measures is retained, because the results from the implicit measure in the previous study were unexpected.

This hypothesis of negative responses to cancer-related information is also extended to the measures of explicit cancer fear used in this study. Threat and efficacy perceptions were predicted to be stronger with HPV information than other forms of information; threat because of the presence of both sexual transmission and cancer information, and efficacy because of the inclusion of information about effective preventative measures such as vaccination. It was predicted that breast cancer would be perceived as having higher threat content than environmental information, but not environmental information (as neither contains vaccination information).

Previous evidence has also suggested that anxiety is associated with threat and efficacy perceptions; relationships between affect and explicit perceptions of threat and efficacy were assessed here.

6.1.2. Hypotheses

1. It was hypothesised that participants given HPV information would show higher knowledge on the topic of HPV than those given other forms of information on a recognition measure.
2. It was hypothesised that negative affective responses would be stronger in the HPV than the breast cancer or environmental information conditions, and stronger in the breast cancer than the environmental condition.
3. It was hypothesised that perceptions of threat would be higher in the HPV than the breast cancer or environmental information conditions, and higher in the breast cancer than the environmental condition.

4. It was hypothesised that perceptions of efficacy would be higher in those participants given HPV than breast cancer or environmental information.
5. It was hypothesised that more negative implicit cancer associations would be observed in participants given HPV information as compared to other forms of information, and more negative associations observed in breast cancer information as compared to environmental information.
6. It was hypothesised that implicit measures and affective cancer fear responses would show a positive association.
7. It was hypothesised that individuals in high anxiety states or with high trait anxiety would show more negative outcomes on threat and efficacy perceptions.

6.2. Methods

6.2.1. Sample

Participants were invited to attend through the recruitment panel of a London university, which was largely composed of staff and students at the university (although was also open to outside registrants), and were paid compensation for time contributed (7 pounds for up to one hour). Eligibility requirements for participation were being female and speaking English as a first language; as possible familiarity with the material was being considered as a possible variable in this study, participants were not screened for prior knowledge or awareness of HPV. The within-between interaction in the implicit measure was again used as the primary outcome in determining sample size, and the results of the previous study were used to generate an a priori sample size (effect size .18, estimated power .89; however, see the discussion of the previous chapter for important difficulties relating to sample size). It was estimated that a sample size of 69 participants would permit detection F-test interactions between three levels of a single independent variable and repeated administrations of the IAT measure (95% CI), although a sample size of 70 participants was eventually used. Ethical approval for the study was obtained from the UCL Research Ethics Committee (see Appendix 16).

6.2.2. Materials

A three-stage process was used to generate the information materials which would be used for the primary between-participants manipulation of the study. The aims of this process were to ensure that the three information sources contained some amount of threat and efficacy content, and the cancer information sources contained a reasonable amount of cancer content.

Initially, a list of bullet point-style facts was collated from the information sources used in the earlier studies and drawn from existing web and print-based information sources. Long-lists of these items were drawn up, and these lists reviewed, discussed and rated (in terms of volume of threat and efficacy content) by a panel of health psychologists. From these discussions and ratings short-lists of facts with balanced contents were created, and these lists evaluated by readability statistics. These final materials were then evaluated using a web-based survey. 25 participants (females only) in this pilot were recruited via a snowballing email method, and each respondent evaluated all three information sources (presented in text format), with the order of presentation randomised. Four questions were presented after each information source, to which participants responded using a five-item likert scale. These questions assessed: severity of the problem ('did the information describe a problem that has SERIOUS NEGATIVE CONSEQUENCES', where the scale was labelled 'not at all' to 'very much so'), the efficacy of the provided solution(s) ('did the information contain recommendations that can deal with the problem EFFECTIVELY,' where the scale was again labelled 'not at all' to 'very much so') and the relevance of the information to the topic of cancer ('how RELEVANT was the information to the topic of CANCER, where the scale was labelled 'not at all relevant' to 'very relevant'). It was estimated from these results that all three leaflets contained demonstrable amounts of threat and efficacy content, with all generating mean scores for both threat and efficacy that were above three (on a five item scale, with five representing the maximum value and one the minimum). The materials differed, however, on how they related to the topic of cancer, with the environmental leaflet scoring less than 1.5 and the cancer leaflet above 4.5.

6.2.3. Design and procedure.

The study's design and procedure closely followed that of the research described in the previous chapter (see p137). The main differences between the two studies were an adapted range of measures: affective response was now examined as a repeat measures dependent variable, and an expanded range of explicit attitudinal scales were used as between subjects/single time point measures.

The procedure was identical to that of the previous study, with the exception that the tests of implicit associations were also administered at the very outset of the session in order to avoid any potential contamination effects.

6.2.4. Measures.

6.2.4.1. Knowledge, memory and thought-listing

The HPV knowledge scale was again used to confirm understanding and short-term recognition memory for the HPV information, and two open-ended measures were employed to examine explicit recall of the presented material and thoughts about the material. These were intended to obtain a simple estimate of the amount of material recalled and the number of discrete ideas and thoughts that the material instigated; in this case no verification of the recalled material was performed, and the number of discrete statements only counted. Duplicate and irrelevant responses were discarded. Both consisted of a short prompt: for the memory measure, the participant was asked to list as many of the terms and/or short phrases that they remembered as possible from the information source. For the thought listing measure, they were instead asked to list all the thoughts they had while reading the source. Rules were provided on the page in order to encourage participants to use discrete statements. a numbered list was provided in the questionnaire to encourage participants to make short self-contained statements; see Appendix 7, p311.

6.2.4.2. Affective states and responses

Rather than the shortened 6-item versions of the STAI used in the former studies, both state and trait subscales of the full STAI were used. The state component of the STAI was administered both in the pre-and-post information phases, while the trait component was used in the pre-information phase only. Changes in state STAI were examined by information condition in order to assess whether the information presented was associated with differential shifts in perceived anxiety. Pre, post, and state STAI scores were also, however, considered as predictors of a number of other outcomes including IAT performance, explicit cancer fear and knowledge uptake.

Two scales were used to assess explicit cancer-specific affective responses. The Burns Cancer Beliefs scale was administered in the pre-information phase and was intended in this study to measure fear towards cancer. Reliability estimates are not available for this scale from the original author but have been cited as between .76 and .91 (Frank-Stomborg & Olsen 2002). A series of questions adapted from Champion et al. (2004a) was used in the post information phase because the items in this scale relate more to the respondent's own perceived physiological and psychological responses to cancer. The scale has been shown to produce reliability estimates of .75 when applied to breast cancer, although the items here were adapted to cancer in general (references in the instrument to 'breast cancer' were replaced with 'cancer').

Perceptions relating to the threat and efficacy content of the information were assessed using the Risk Behaviour Diagnosis Scale (RBDS). A full account of the use of this instrument is provided in Chapter 2 (see p75). To reiterate, it is necessary that the scale is adapted to each of the three information conditions, and these adapted versions are shown in Appendix 12 (p357). Where participants are given environmental information, the threatening condition is damage to the environment and climate, and the appropriate remedial response is recycling. Where participants are given breast cancer information, the threat condition is breast cancer, and the remedial response is breast screening. Where participants are given HPV/cervical cancer information, the threat condition is HPV, and the remedial response is vaccination against HPV.

Questions on the RBDS are split into four subcomponents: susceptibility (e.g." I am at risk for getting breast cancer") and severity (e.g. "I believe that breast cancer is extremely harmful") of the target condition, and response efficacy (e.g. "Breast screening works in the prevention of breast cancer") and self-efficacy (e.g. "I can easily attend screening to prevent breast cancer") of the recommended treatment. These measures are shown in the context of the full questionnaire in Appendix 7 (p311).

6.2.4.3. Content evaluation responses.

A semantic-differential scale was used to measure content evaluation responses on eight dimensions, in which the items used were drawn partly from those used in the two previous studies, but also from the informal comments of participants in those studies. One benefit of a semantic differential scale is that it avoids anchoring responses to numbers (as per likert scales); participants were asked to mark the position on a line between various dimensions on which they would place the information. A standardised scale of distance is then used to divide the response line into numeric values from 1 to 8. Two of these dimensions (*scary-not scary* and *funny-not funny*) were included to match the evaluative terms included in the implicit task, and others were included to mirror the evaluative questions used selectively in the previous study (although across all conditions in this case; *not-reassuring-reassuring; not interesting-interesting; not pleasant-pleasant*). Three other dimensions were included to assess the novelty (*familiar-not familiar*) and relevance (*irrelevant-relevant*) of the information, and also the impression of the overall convincingness of the information (*convincing-not convincing*). The content evaluation measure is shown in the context of the full questionnaire in Appendix 7 (p311).

6.2.4.4. Implicit associations

A single-category implicit association task (as per the design and methods outlined in the previous chapter) was used, again with one instance of the task administered before the presentation of information and a further instance following. Similar analyses were used, although in an attempt to refine the methods of the previous chapter only the main

outcome measure is reported here: that is the compound IAT score (which diagnoses evaluations of cancer-related terms at a given time point).

6.2.5. Statistical methods and analysis

The same statistical methods were employed as in the previous study (see p141).

6.3. Results

6.3.1. Hypothesis 1: Knowledge

It was hypothesised that participants given HPV information would show higher knowledge on the topic of HPV than those given other forms of information on a recognition measure. Analyses of the recall and thought-listing measures are also presented here.

Scores on memory and thought-listing measures are summarised in Table 11 (p169). The HPV group attained an average score of 11.54 on the HPV knowledge scale, compared with scores of 6.90 and 6.00 for the environmental and breast cancer groups; these scores are comparable with the previous study. Reliability estimations were carried out across all participants for this measure, and a Cronbach's alpha of .86 was obtained.

Table 11. Knowledge responses by information condition.

	Information condition								
	Environmental [a]		Breast Cancer [b]		HPV				
	Mean	SE	Mean	SE	Mean	SE	F	P Value	
Open-ended measures									
Items listed in recall	10.26	1.11	10.72	0.99	10.80	0.89	0.08	0.92	
Thoughts Listed	4.75	0.39	4.73	0.49	5.39	0.48	0.65	0.53	
HPV knowledge	6.90	0.96	6.00	0.81	11.54	0.45	14.49	>.01	[ab]

Superscript denotes significant planned comparisons between the HPV information group and the indicated control group(s)

Following exposure, there were significant group differences in HPV knowledge, $F(2, 67) = 15.50$, $p < .01$, with the group given HPV information scoring higher than either the environmental, $F(1, 67) = .16.60$, $p < .01$, or the breast cancer, $F(1, 87) = 12.05$, $p < .01$, groups.

Two open-ended measures were employed to examine explicit recall of the presented material and thoughts about the material. A count was made of the number of correct items of content listed, and duplicate or irrelevant items discarded. Respondents providing no entries were given a score of zero. Similarly for the thought listing question, a count of discrete statements was made. Neither the numbers of thoughts listed or number of items of content remembered varied across information conditions: respectively, $F(2, 63) = .65$, $p = .52$; $F(2, 58) = .08$, $p = .92$.

6.3.2. Hypothesis 2: Affective states and responses.

It was hypothesised that negative affective responses would be stronger in the HPV than the breast cancer or environmental information conditions, and stronger in the breast cancer than the environmental condition.

Affective measure means are shown in Table 12 (p171). Group means for the state anxiety subscales show that scores are slightly elevated above the population mean of 35 in a number of cases, but in all cases fall short of the clinical cut-off mean of 49. Trait anxiety also appeared slightly higher than the non-clinical means of 36 reported in earlier findings.

Analyses were first used to check for differences between the information groups at the start of the testing session (i.e. pre-exposure to information): no effects of independent variable group were observed on state, $F(2, 65) = .99$, $p = .38$, or trait anxiety, $F(2, 63) = 1.45$, $p = .24$ during the pre-information phase.

Table 12. Affective responses by information condition.

	Information condition						Between groups	
	Environmental		Breast Cancer		HPV			
	Mean	SE	Mean	SE	Mean	SE	F	P Value
State anxiety (STAI; range 20-80)								
Baseline	35.38	1.94	40.17	2.44	39.30	2.98	.99	.38
Post-information	34.73	2.08	38.00	2.23	36.82	2.58	.51	.60

ANOVAs were carried out to examine effects of HPV information condition on perceived state anxiety. A 2 (pre-and post-information) by 3 (environmental, breast cancer or HPV/cervical cancer information) analysis was used to test for main effects of time and interactions between time and information condition: neither were shown to have significant effects upon state anxiety: respectively, $F(1, 64) = 1.98$, $p = .16$; $F(2, 64) = .49$, $p = .61$.

Similarly, no between group effects were observed on the general cancer fear items. With the scale ranging from scores of 8 to 40, the environmental, breast cancer and HPV groups obtained mean scores of 23.28, 25.69 and 26.54 respectively following presentation of information. These differences were not significant: $F(2, 67) = 1.36$, $p = .26$.

6.3.3. Hypotheses 3 & 4: Threat and efficacy responses.

Firstly, it was hypothesised that perceptions of threat would be higher in the HPV than the breast cancer or environmental information conditions, and higher in the breast cancer than the environmental condition. Secondly, it was hypothesised that perceptions of efficacy would be higher in those participants given HPV than breast cancer or environmental information.

Table 13 (p172) summarises the outcomes on these measures across information conditions. Significant effects were observed on each of the three subscale variables of the risk behaviour diagnosis scale, comprising threat, $F(2, 67) = 8.04$, $p = .01$, efficacy,

F (2, 67) = 7.41, p = .01, and critical value, F (2, 67) = 3.61, p = .01. In terms of the perceived threat of the target condition, planned comparisons showed that HPV information was rated as less threatening than environmental information, F (1, 65) = 14.21, p < .01, but not breast cancer information, F (1, 65) = .04, p = .55. In terms of the perceived efficacy of the recommended response, HPV information was rated as more efficacious than breast cancer information, F (1, 65) = 6.35, p = .01, but not environmental information, F (1, 65) = 1.81, p = .18.

Table 13. Cancer-specific responses by information condition.

	Information condition								
	Environmental[a]		Breast Cancer[b]		HPV				
	Mean	SE	Mean	SE	Mean	SE	F	P Value	
Risk behaviour diagnosis variables									
Threat (range 6-42)	35.22	1.13	30.72	0.93	29.87	0.95	8.03	0.01	a
Efficacy (range 6-42)	31.90	1.10	24.13	1.85	29.20	1.24	7.41	0.01	b
Critical value (range +/- 36)	-3.31	1.06	-6.42	1.96	-0.66	1.44	3.61	0.03	b
Cancer attitudes: explicit measures									
General cancer fear scale (range 8-40)	23.28	1.36	25.69	1.39	26.54	1.49	1.36	0.26	

Superscript denotes significant planned comparisons between the HPV information group and the indicated control group(s)

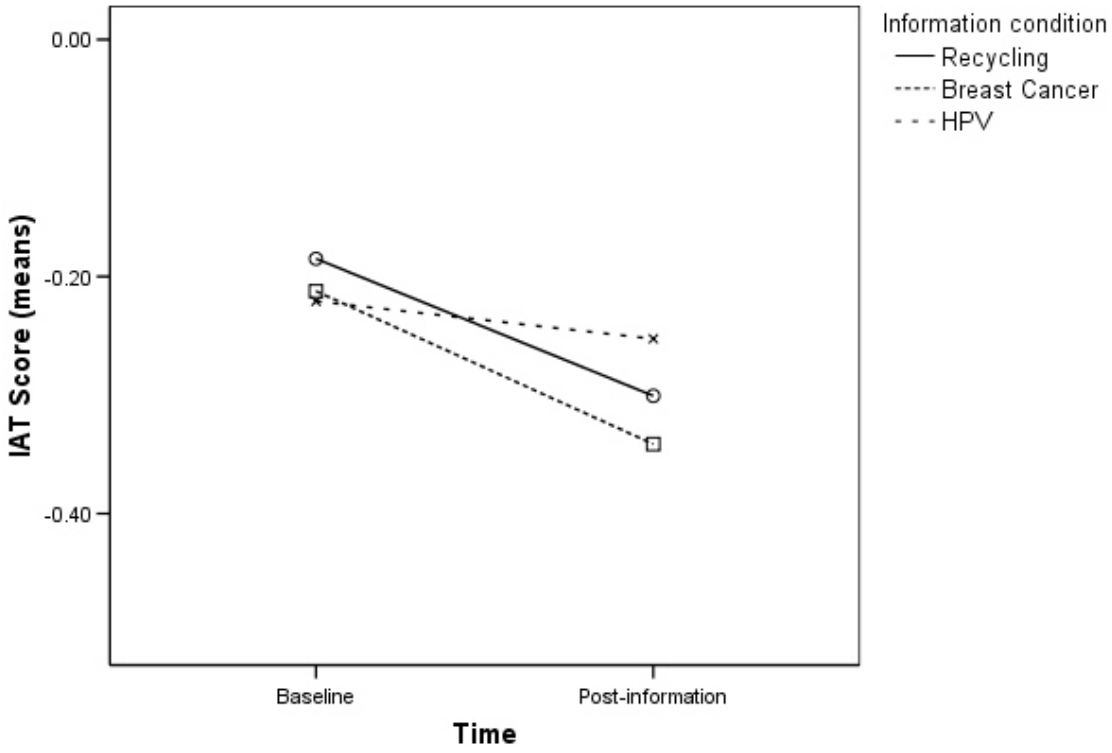
With regard to the final critical value (which is derived from the threat and efficacy scores), HPV information elicited a significantly lower value than breast cancer information, F (1, 64) = 7.22, p < .01, but not environmental information, F (1, 64) = 1.56, p = .22. The distance and direction of group means from zero is important in this analysis, because the EPPM predicts that individuals will enter into different psychological response states depending on whether the critical value is positive or negative; and although all the values are negative in these analyses (indicating fear control status) all are small negative values (particularly in the HPV information group).

6.3.4. Hypothesis 5: Implicit associations.

It was hypothesised that more negative implicit cancer associations would be observed in participants given HPV information as compared to other forms of information, and more negative associations observed in breast cancer information as compared to environmental information.

An analysis of variance was carried out on the compound IAT scores generated by the implicit association test at the pre-information stage in order to check for successful randomisation of participants to the three information conditions; no differences between the three conditions were shown, $F(2, 66) = .40$, $p = .96$. A mixed ANOVA examining two levels of the repeated variable time (pre-test and post-test) and three levels of the between-subject variable information condition (environmental, breast cancer and HPV/cervical cancer information) was then carried out, and these outcomes can be observed in Figure 9 (p174). No significant interaction between time and information condition was detected, $F(2, 64) = .35$, $p = .70$, although there was a trend towards a main effect of time, $F(2, 64) = 3.15$, $p = .08$.

Figure 9. IAT scores split by information condition and time of measurement.



Higher IAT score indicates more positive evaluation of target concept. Interaction effect is not significant at $p < .05$

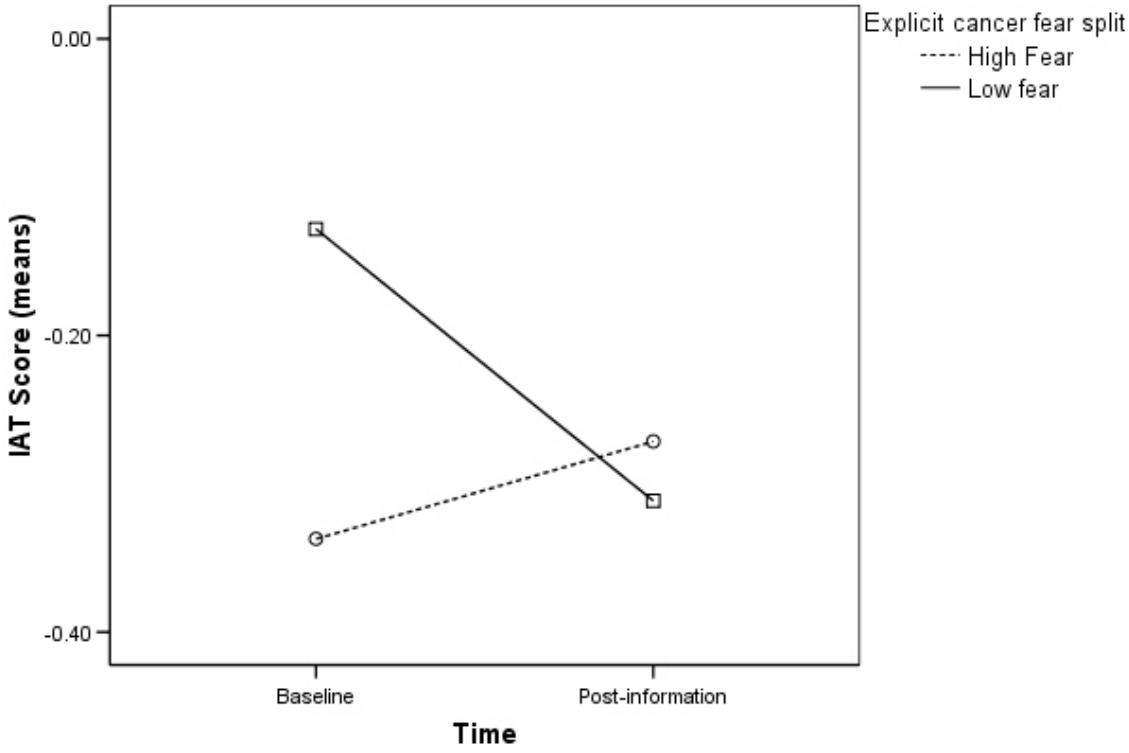
6.3.5. Hypothesis 6: Implicit and explicit measures.

It was hypothesised that implicit measures and explicit cancer fear measures would show a positive association.

In analyses of correlations, no significant associations were shown between implicit and explicit measures of cancer-related measures. In order to investigate this issue further however, participants were also split into low and high explicit cancer fear groups using the components of the Burns scale, and these analyses are summarised in Figure 12 (p202). A 2x2 ANOVA (time: pre-test, post-test x fear: low explicit fear, high explicit fear) were carried out on the compound IAT scores with those participants given cancer-related information (n=44). Only dividing participants into high and low

fear subscale groups produced observable differences in terms of implicit associations. The interaction obtained between time and explicit cancer fear, $F(1, 43) = 3.24$, $p = .08$, was not significant, but as is shown in Figure 10 (p175) may suggest an emerging relationship whereby those individuals who are in the low-explicit fear group show a lower implicit negative evaluation of cancer terms at baseline than those in the high explicit fear group, with the differences between the two groups reduced in the post-information evaluation.

Figure 10. IAT scores split by cancer fear state and time of measurement in participants given cancer-related information.



Higher IAT score indicates more positive evaluation of target concept, with an IAT score of zero indicating no preference. Interaction effect is not significant at $p < .05$.

6.3.6. Hypothesis 7: Affect as a predictor variable.

It was hypothesised that individuals in high anxiety states or with high trait anxiety would show more negative outcomes on threat and efficacy perceptions.

A series of analyses were carried out to examine associations between the three measures of general anxiety employed (trait anxiety and pre-and post-information measures of state anxiety) and RBDS values and explicit cancer fear items. As no between group differences were shown in terms of anxiety of any of the measures employed, individuals were split into low and high anxiety groups on each of the three measures. As the focus of these analyses was in terms of general trends across the dataset, participants from all three information conditions were combined. Few significant effects were observed throughout, but patterns can be described on a number of outcomes.

Those individuals with high trait anxiety were significantly more likely to fall into negative values of the critical value variable of the RBDS scale, $F(1, 61) = 10.66$, $p = .01$, and therefore into a fear control state. This finding is partially supported by the individual scores for the threat and efficacy components of the scale, of which the critical value variable is a compound. Both show trends in the direction suggested by the previous finding: threat, $F(1, 62) = 3.78$, $p = .05$, and efficacy, $F(1, 62) = 3.09$, $p = .084$.

Individuals with high anxiety in both the pre and post information phases scored significantly higher on the explicit general cancer fear items, $F(1, 64) = 5.68$, $p = .02$; $F(1, 65) = 11.99$, $p = .01$, as adapted from Champion et al. (2004).

6.3.7. Content evaluation responses.

The means and differences between information groups on the semantic differential scale are summarised in Table 14 (p177). Overall between group differences were observed on three of the eight dimensions in the scale: Irrelevant-relevant, $F(2, 64) =$

5.99, p = .01, with HPV information rated as more relevant than environmental information, F (1, 64) = 11.22, p < .01; convincing-not convincing, F (2, 64) = 5.91, p = .01, with HPV information rated as more convincing than environmental, F (1, 64) = 9.32, p = .01, and breast cancer, F (1, 64) = 8.24, p = .01, information, and not familiar-familiar, F (2, 64) = 6.15, p = .01, with HPV information rated as less familiar than environmental information, F (1, 64) = 12.27, p =.01. Smaller differences (though not significant at the level of p < .05) was also observed on the dimensions of not reassuring-reassuring, F (2, 64) = 2.86, p = .06, with HPV information rated as more reassuring than environmental information, F (1, 67) = 5.69, p = .02, and scary-not scary, F (2, 64) = 2.69, p = .08, with HPV information rated as more scary than breast cancer information, F(1, 67) = 5.37, p = .24.

Table 14. Evaluative responses by information condition.

	Environmental[a]		Breast Cancer[b]		HPV				
Range 1-8	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	F	P Value	
Irrelevant-relevant	5.09	0.61	6.54	0.28	7.04	0.29	5.99	0.01	a
Not scary-scary	4.64	0.50	3.87	0.41	5.29	0.41	2.69	0.01	b
Not reassuring-reassuring	4.00	0.45	4.75	0.30	5.29	0.39	2.86	0.06	a
Not interesting-interesting	6.23	0.43	6.17	0.32	7.04	0.16	2.37	0.10	
Not pleasant-pleasant	3.68	0.39	3.29	0.20	3.29	0.34	0.49	0.61	
Not convincing-convincing	5.86	0.35	5.96	0.27	7.04	0.19	5.91	0.01	ab
Not familiar-familiar	5.73	0.38	4.71	0.41	3.62	0.46	6.15	0.01	a
Not funny-funny	2.14	0.32	1.57	0.20	2.04	0.30	1.18	0.31	

Superscript denotes significant planned comparisons between the HPV information group and the indicated control group(s)

6.4. Discussion

There were two aims of this study: firstly, to investigate patterns of responses with a more closely controlled independent variable. And secondly, to extend the range of measures previously used to include explicit measures of cancer attitudes and content recall; assessment of stable traits relating to anxiety; and standardised measures of threat content as drawn from the literature on fear appeals.

Using a more closely controlled independent variable, with differences between the information sources limited to content only, fewer notable differences between information conditions were observed in this study as compared to the previous studies overall. Differences persisted on some measures however: in line with the stated hypotheses the HPV information group again showed higher HPV-specific knowledge on a recognition type task; measures of explicit recall however showed no differences by information condition. This is in line with the results of the previous two studies (p118 and p142). It is also in line with the evidence reviewed in chapter 1 on studies of HPV awareness (p31); for example Klug et al.'s (2008) findings from a systematic review of knowledge studies showed consistently poorer outcomes on recall than recognition measures.

Again in accordance with hypotheses, and similar to the previous studies in this series (see results on p119 and p142), no between groups effects were observed in terms of state anxiety (even when using the full STAI instrument).

Few differences were obtained on explicit measures of cancer fear. The general cancer fear items, as drawn from Champion et al., 2004, were novel in this experimental series, and previous evidence had shown cancer fear as indexed by this scale to be associated with screening behaviours and attitudes (e.g. Russell et al, 2006; Talbert, 2008). However, in this study the scale was used as an outcome measure, and no significant differences between the three information provision groups was shown. This is reassuring in that provision of HPV information does not appear to increase explicit cancer fear.

The Burns Cancer Beliefs Scale (Burns, 1981) was also used to examine explicit cancer fear, although, as specified to be a measure of more trait-like constructs, was used to examine associations with implicit measures. The hopelessness and stigma scales showed no such associations, but an emerging interaction was observed in the cancer fear items and implicit measures when participants were given cancer-related information. At baseline, participants with low explicit cancer fear showed less implicit cancer fear, with this difference disappearing after presentation of cancer-related information. However, the main change over time that facilitates this interaction is the participants with low explicit cancer fear showing greater implicit cancer fear after presentation of cancer-related information. This may be a result of regression to the mean in the two groups; on the other hand, it may be that individuals with initial high explicit cancer fear are already at the ceiling for the impact of the leaflet over time. There is unfortunately little previous evidence to draw on here; a study by Miles et al. (2008) had shown that cancer fear was associated with avoidance of cancer-related information, and low performance on an implicit task may represent a similar mechanism; attention avoidance of cancer-related information during the SC-IAT may well result in poorer performance on the task.

The risk behaviour diagnosis scale was also used to assess threat and efficacy perceptions, and is the primary instrument used by Witte's (2000) EPPM. Though the present use of the model is novel (that is, in an HPV information provision context), Smith et al.'s (2009) study provides the most relevant comparison point, showing significant boosts to perceptions of threat and efficacy over time following presentation of information about hearing loss. In line with the Smith et al study, both threat and efficacy appeared to show significant effects in response to the information provided in the present study. In a deviation from this study's hypotheses however, threat perceptions were highest of all in the group given environmental information. The HPV and breast cancer information sources were given similar mean ratings, both of which were in the upper end of the scale. Therefore while all sources were rated as threatening (in line with the pilot analyses and refinements of the sources), environmental information was rated as the significantly more threatening. This may be because threat as defined by the RBDS is an additive measure composed of susceptibility and severity. Individuals may have higher base levels of threat

perceptions about environmental issues, particularly in terms of susceptibility: for example, a lay view of climate change might perceive it as affecting all individuals on the planet equally whereas disease occurs on an individual basis. A different pattern is observed in terms of perceived efficacy, where the lowest rating is given to the breast cancer information source and higher ratings to the environmental and HPV sources. Again this finding is not entirely in line with the stated hypotheses: it was predicted that efficacy perceptions would be higher in the HPV than environmental and breast cancer conditions.

The final value considered by the EPPM is a combination of threat and efficacy variables, and is suggested to determine the behavioural and/or psychological response of the individual. Given that this variable is calculated simply by offsetting the individual's threat score by their efficacy score, the resultant pattern of means shows that breast cancer information proves the most likely to bring about a fear control state. HPV and environmental information, on the other hand, average out to produce critical values that are close to zero, with the environmental information resulting in a mean of -3.31 and the HPV information in -.66. Though both are negative and should therefore cause individuals to engage in fear control, considered in light of the possible scoring range of the critical value (which is +/- 36) it is difficult to know whether this effect would be strong enough to indicate a meaningful psychological response. In a previous study using the RBDS however, Lavela, Smith & Weaver (2007; as discussed in Chapter 2, p76) suggested that individuals with critical values close to zero were the least likely to be engaged with the health issue in question. This demonstrates a possible issue with the method by which the EPPM calculates critical values using the RBDS items: a small critical value can be generated by a range of combinations of efficacy and threat perceptions. For example, the present study shows low critical values despite moderate threat and efficacy perceptions; Lavela, Smith and Weaver also showed low critical values, but resulting from low threat and efficacy perceptions.

The results of the implicit attitudinal measure used in this study avoided the group differences at baseline that affected the previous study (as discussed as a limitation in the previous chapter; see p154), but the pattern of results over time also differs in these results. In that study there were indications towards an interaction between information condition and time of measurement (that is, that those groups given differing forms of

information showed significantly different patterns of performance change across the two tasks). There was no evidence for such an interaction in the outcomes reported here; indeed IAT performance seems relatively stable over time in these results, with cancer terms being evaluated as consistently negative throughout. This suggests that the alternative information materials used may have had a smaller magnitude of effect on implicit measures than in the materials used in the previous study, or that both studies showed regression to the mean (although the mean at post-information provision in the current study seemed consistently lower in the current study than the previous study, suggesting that the provided information materials were eliciting responses of some sort).

Contravening the hypothesis that implicit measures and explicit affective responses towards cancer would show a significant positive association, no significant associations were shown. Recalling the literature reviewed in Chapter 2 (p58), relationships between implicit and explicit measures are a complex issue to investigate because there are some instances where the two types could be predicted to show a relationship, and others where they may be predicted to differ (e.g. Hofman et al., 2005; Greenwald et al., 2009). In practice this is largely a process of refining hypotheses based on accumulating evidence; in the current case however there was no prior evidence available about relationships between implicit and explicit measures of cancer attitudes. These analyses are therefore revisited and extended in Chapter 8, where a fuller exploration of these issues is also made.

The semantic-differential task also permitted explicit evaluations of the presented information on a wider set of dimensions. As noted in the introduction to this chapter, use of a semantic differential scale (Himmelfarb, 1993; Snider & Osgood, 1969) was novel in terms of evaluating health information. However, while a number of interesting findings emerged on these dimensions these were difficult to interpret in terms of any meaningful pattern. For example, evaluations of the material as 'scary' versus 'not scary' do not necessarily correspond with those provided by the RBDS discussed previously, with the information on breast cancer here being rated as the most 'scary.' In order to better examine the potential applications of this type of instrument, it was thought that a range of items should be included which better represent the responses to HPV information as specified by earlier qualitative research, and factor

analysis carried out on the obtained results. These changes were to be considered in the following study chapter.

These findings also have a number of further implications in terms of HPV information provision. First is that standardised measures of threat and efficacy reflect the mixed emotional responses to HPV information observed in earlier work. Second, the EPPM and various dual process models (as reviewed by Evans, 2000) may provide similar explanations for the mechanisms that should come into play when these two variables are high. What were previously assumed to represent positive versus negative evaluations may be better represented as automatic versus deliberative evaluations. This is a significant principle in terms of health information provision because it helps to break down the requisite responses to information that will ensure that it is remembered and acted upon. In the case of HPV information, it is firstly of crucial importance that women not only attend to and retain memory for HPV information. This may be enhanced by the inclusion of threat content. Of equal importance however is that women are able to assimilate a detailed enough understanding of that information in order to understand the positive implications of the message and the efficacy of the recommended response.

Michie et al. (2003; along with other research in informed consent as discussed in previous chapters, p22 and p48) showed that basic knowledge may be a pre-requisite for preventative behaviours, but not necessarily a reliable predictor. The sample in the present study appeared to be able to assimilate the provided information reliably according to a measure of recognition, though less so on measures of recall. Though recognition is ostensibly a less demanding task than recall, this has possible implications for informed decision-making: what depth of knowledge (that is, as enables full recall or merely recognition along) is necessary to permit informed decision-making? This issue may be exacerbated in populations with lower health literacy; for example, individuals who are not native-speakers in the language of the information source may be a different prospect, because in those groups it may be the fear and threat content that is primarily communicated to the cost of the positive implications.

6.4.1. Limitations and conclusion

The discrepancy between this result and that of the former study raises a number of questions that this study's results cannot answer. Firstly, is the smaller degree of change observed in this study merely an effect of the avoidance of differences at baseline in the current results, or could it be due to the different manipulation that is used between information conditions here? This study used information sources condensed down to simple information sheets, the contents of which were pre-piloted to ensure the presence of both threat and efficacy content. The previous study with women of university-going ages involved more naturalistic materials in the form of leaflets with images; it may be that this format is more likely to cause changes in the associations measured by the IAT over time. Previous studies have shown that the inclusion of images exacerbates positive effects (e.g. Michielutte et al., 1992; Austin et al., 1995; Delp and Jones, 1996; Mansoor and Dowse, 2003). Specifically, this format might have a particular impact when combined with information about an established health threat, possibly explaining the more negative associations following breast cancer information observed in the previous chapter.

Participants in this study were again recruited from a university population, with the continuing issue that there may be a correlation between cognitive style and academic achievement (Diseth, 2003b). This limitation also unfortunately applied to each of the following studies in this series due to resources in participant recruitment. This issue will be revisited in the general discussion chapter.

This study has generated a number of findings, many of which could inform a more specific set of research questions about responses to information provision. Regrettably, the limited scope of this experimental series means that it will not be able to address these avenues in terms of operationalising them through experimental manipulations. A more limited scope was therefore used for a final data-generating study, as presented in the following chapter. This study focussed on developing a final version of the general methodology for taking forward in future research, and achieving a compromise on the information materials used in relation to the IAT measure.

Comparing these results with those reported in the previous chapter raises a number of questions; particularly with respect to the implicit measure. Implicit cancer associations appeared to be somewhat malleable in the former study, while here they did not. The following and final study used a set of information material retaining the format and structure of those used in the previous chapter and the content of those used in this chapter. It remains unclear as to what degree implicit associations can be affected by presentation of a single information source, and the results obtained so far suggest that a formatted, leaflet-style source with accompanying images has greater potential for bringing about changes in associations than a simple text-only source.

7. Responses to materials using a refined paradigm

7.1. Introduction

In the previous studies different implicit effects have been shown depending upon the information materials used. Naturalistic materials were associated with some changes in implicit associations (see the results on p144), but when materials were more closely controlled these changes were not observed (see the results on p173). For the purposes of differentiating between the two, the study presented in Chapter 6 will be referred to as the naturalistic-materials study, and the study in Chapter 7 as the controlled-materials study. In this study a set of materials is employed that combines the appearance of a set of practical, real-world materials (including images and constructed in a leaflet format) with the better-specified content of the materials from the controlled-materials study. In the naturalistic-materials study, an interaction effect was observed whereby presentation of breast cancer information was associated with more negative subsequent implicit evaluations of the target category of 'cancer.' In the controlled-materials study however, using better-specified content and having removed images from the information materials (as well as moving towards a more basic 'fact-sheet' style), no such effect was observed. If differences are observed in this final study (where the content remains the same as the previous study but presented in a leaflet format with images) it may be possible to speculate as to the role of design and imagery in determining responses to health information materials, with previous studies showing that the inclusion of imagery in health materials tends bring about more extreme responses (e.g. Michielutte et al., 1992; Austin et al., 1995; Delp and Jones, 1996; Mansoor and Dowse, 2003; as briefly discussed in the previous chapter, p183).

It was also hoped that the use of an implicit paradigm could be improved upon in this study by modifying the evaluative categories employed in the implicit association test. Greenwald and Nosek (2001; see also Greenwald et al. 2003), in a review of IAT methodologies, suggested that the specific character of category labels in the task should not affect the results of the task; however, this was not and has not been supported by any dedicated studies. A study by Mitchell et al. (2003) also showed that

variations in the design of an IAT, including those relating to evaluative category choice, may have unexpected effects upon the test's findings (these studies are discussed in more detail in Chapter 8; see p219). This is a significant concern in the present studies because participants in previous studies had expressed surprise at the difficulty of the task, particularly when the target category of *cancer* was paired with positive evaluative category of *funny* (those trials where the categories of *cancer* and *funny* were on the same response key). This evaluative dimension of scary/funny was used because it reflected the primary emotion of fear, as was demonstrated to be relevant to HPV in the classroom-based study reported in Chapter 4 along with previous qualitative evidence. In terms of selecting appropriate category labels, *funny* was employed in the previous studies as the antonym of *scary*, but given the difficulty of the task to participants using these categories, use of simpler labels may produce different results. In this study an attempt is made to move towards a wider view of response evaluation, and introduces a more generic set of evaluative categories. This would also rectify a further potential problem: the category *funny* could be considered overly incompatible with the target category of *cancer* (therefore creating a bias towards strongly negative IAT results) because it has more specific semantic connotations and meanings than a generic category (such as *good*). In this study basic evaluative categories of *positive* and *negative* are used, as set out by the original specification of the single-category IAT, in order to address the possible biases involved in using very specific response categories.

The studies reported in the previous chapters have shown few negative affective responses to presented information, and the resulting overall impression is that respondents are surprisingly resilient in terms of changes in anxiety. One conclusion so far would be that stated explicit assessments of the target material do not translate into *felt* or perceived affective responses. This is in many ways a reassuring finding, demonstrating that respondents can carry out rational evaluations without necessarily feeling negative emotional responses. It may be useful however to introduce a measure of perceived emotional and rational responses to explore this further, as suggested by Epstein et al. (1995) who puts forward the trait concepts of experientiality and rationality. Epstein's Cognitive-Experiential self theory (CEST) approach, it may be recalled, was one of the dual process theories mentioned in Chapter 2 (in the introduction to dual-processing models, p49). Epstein's (2008) experiential system is

nonverbal and automatic, and the rational system a mechanism of verbal reasoning; but Epstein's model differs from other dual-process theories in that rationality and experientiality are stable individual trait dimensions which can be gauged via self report. Epstein (1998) suggests a tool (the Rational Versus Experiental Inventory; RVEI) that can be used to generate trait measures of both variables in an individual. However state responses are also of interest in this study: an open-ended, direct-report measure of emotional versus rational response is also employed for this purpose, as adapted from Rothman et al. (1999). While the original use of this item examined responses to a different health condition (in, the case of Rothman et al., 1999, gum disease) the item is not specific to the threat condition under study and so is suitable for use here.

The RBDS instrument, derived from the variables of the EPPM and including measures of threat and efficacy, appeared to be sensitive to the information provided in the previous study, though not as was predicted by the study's hypotheses. One issue was that the average critical value (which is calculated by balancing perceived efficacy against perceived threat on an individual basis) for each of the groups was generally a very negative small number, indicating a weak fear control state. The EPPM provides little information about expected behavioural effects in such cases, so in analysing and interpreting data the individual efficacy and threat values seem to provide better measures of response; though all information types were rated as threatening in the previous study, the environmental source was in fact rated the most threatening (see p171). It does however remain to be seen whether this will continue to be the case where a more naturalistic set of information materials is used. The RBDS variables proved more useful in the previous study in assessing responses to the presented information than did the explicit cancer fear items; as strong association effects were not shown with those items, they were not used in the present study.

7.1.1. Aims

As the final piece of practical work in this experimental series, the aim of this study was to further improve the range of measures used and examine their reliability and

suitability for future use in this sample type, and answer outstanding questions relating to the information sources used.

As with the previous studies, higher HPV knowledge in response to provision of HPV knowledge was predicted. Maintaining the hypothesis generated for the prior study (see p163), which was supported by that study's findings (p170), it was predicted that no differences would be shown between information provision conditions on measures of affective response.

The RBDS was again used to examine explicit threat and efficacy perceptions in the presented information. The previous study's findings were unexpected, with environmental information being perceived as the most threatening overall; the current study will examine these effects with a more naturalistic set of information materials, and accordingly maintains the hypothesis set out in the previous study. It was predicted that effects on implicit measures would be similar to those in the naturalistic materials study (Chapter 5, as described on p137), with fewer increases in performance over time in the breast cancer information group. Behavioural intentions were studied in using repeated measures at pre and post-information stages. Predictions on these measures were based on those from the earlier study with adolescents (p122), with HPV information predicted to elicit greater behavioural change than other forms of information.

Content evaluation and rationality-experientiality measures were also employed, but predictions were not made for these items due to the novelty of their use in this context. Between-group differences in content evaluation (using the semantic differential scale introduced in the controlled-materials study) were again analysed using post hoc comparisons. Given that this is a novel instrument, reliability and factor analyses were used to determine its utility in future work. (It was decided that this analysis should be carried out on the instrument used in this study rather than in the previous chapter, as an expanded range of items was considered here.) Measures of rationality and experientiality were also introduced, including the RVEI and an open-ended measure similar to that used in the previous study. The potential roles of these variables of predictors of affect and content evaluation variables were examined.

7.1.2. Hypotheses

1. It was hypothesised that knowledge would be higher in the group given HPV information compared to those groups given other forms of information.
2. It was hypothesised that no changes in anxiety would be observed in relation to information presented.
3. It was hypothesised that HPV information would be rated as more threatening than breast cancer or environmental information using the RBDS, but also as more efficacious. Breast cancer information would also be rated as more threatening than environmental information.
4. It was hypothesised that there would be an interaction between time of measurement and information condition on the implicit association test, with less evidence of performance increase over time in the breast cancer information group.
5. It was hypothesised that HPV-related information would elicit greater positive changes in intentions than alternative forms of information.

7.2. Method

7.2.1. Sample

Participants were invited to attend through the participant recruitment panel of a London university, composed of both staff and students, and were paid compensation for time contributed (eight pounds for a testing session lasting no longer than one hour). Eligibility requirements for participation were being female and speaking English as a first language. The same power calculations as per the previous study were used, which predicted that 69 participants would detect within-between interactions on the basis of the results of the initial IAT study used in this thesis; the limited resources and participant pool meant that only 60 participants were tested however. Calculations indicated that this sample size would power the interaction analysis to detect slightly larger effects only (those of approximately .3). The study was covered under the

ethical approval application as obtained for the previous study, and this was from the UCL Research Ethics Committee (see Appendix 16, p366).

7.2.2. Materials

The materials used in this study combined aspects of those from the previous two data chapters, and are shown in Appendix 8 (p332). The leaflet-style presentation of Chapter 5's information materials was used, along with the more closely controlled and piloted content developed for Chapter 6. Breast cancer and environmental information sources were used as controls.

7.2.3. Design and procedure

The study's design and procedure closely followed that of the research described in the previous two chapters (see p137, p166), with participants randomised either to exposure to HPV/ cervical cancer information or to one of two other forms of information using a computer-generated list. Alongside the addition of other single time point dependent variables as outlined in section 7.4.4, behavioural intentions were also included as a repeat measures dependent variable.

7.2.4. Measures

7.2.4.1. Knowledge.

The HPV knowledge scale, as used in the previous adolescent-sample and university-age sample studies, was used to confirm understanding and short-term recognition memory for the HPV information. A single open-ended prompt was also used to assess participants' received views of the information (*in the space below, please try to summarise the 'gist' of the information in the leaflet in one short sentence*), and this item was intended to assess received knowledge by a method other than recall. This

measure is shown in the context of the full questionnaire used in this study in Appendix 9 (p335).

7.2.4.2. Affective states and responses

Both state and trait subscales of the STAI were used. The state component of the 6-item short-form STAI was administered in both baseline and post-information phases, while the 20-item trait component was used at baseline only, and these are shown in Appendix 9 (p335). Given that similar effects were shown in the previous studies regardless of whether the short or long form of the state STAI was used, it was decided to employ the short form of the state STAI in order to reduce the demands on the participant. Changes in state STAI were examined by information condition to assess whether the different sources of information were associated with differential shifts in perceived anxiety. STAI scores were also considered as predictors of IAT performance, explicit cancer fear and knowledge uptake. Previous estimates of .83-.90 have been achieved during internal validation of the state subscale of the STAI, along with estimates of .91 of the trait subscale (Marteau and Bekker, 1992, der Bik et al., 2003).

7.2.4.3. EPPM variables

Perceptions of threat and efficacy were again examined using the risk behaviour diagnosis scale (RBDS). This instrument was tailored to the same specifications as in the previous chapter: where participants are given environmental information, the threatening condition is damage to the environment and climate, and the appropriate remedial response is recycling. Where participants are given breast cancer information, the threat condition is breast cancer, and the remedial response is breast screening. Where participants are given HPV/cervical cancer information, the threat condition is HPV, and the remedial response is vaccination against HPV. As in the previous chapter, reliability analyses of the four subscales are considered but only threat and efficacy are used as main outcome measures (these are derived from the four subscales). The three configurations of the RBDS are shown in Appendix 12 (p357).

7.2.4.4. Implicit associations

A single-category implicit association task (as per the design and methods outlined in the previous chapters) was used. Each instance of the task generated a measure of implicit evaluation of the target category 'cancer,' and this measure was administered both before the presentation of information and a further time after presentation. In a change from the previous implementations of the task, however, the evaluative categories of 'positive' and 'negative' were used rather than 'funny' and 'scary.' The evaluative category labels located on the response key indicators were therefore changed to positive and negative, and an alternative word pool used to generate the stimuli to which participants responded. These evaluative categories were the same as those used in Karpinski& Steinman (2006), and so it was possible to employ the same stimulus pool as developed by these authors (see Appendix 11, p356). Similar analyses were used as in the previous chapter, with the compound IAT score (which produces evaluations of cancer-related terms at a given time point) used as the primary outcome measure.

7.2.4.5. Behavioural Intentions

A novel six-item instrument was used to assess future behavioural intentions with respect to a number of actions relevant to sexual health and HPV prevention/detection, and responses were quantified with 7-item likert scales, labelled 'very unlikely' to 'very likely.' These items assessed intentions to speak to a potential partner about STIs before engaging in unprotected sex; intentions to speak to a potential partner about HPV before engaging in unprotected sex; likelihood of accepting a general STI test in the next three months if offered; likelihood of accepting a smear test in the next three months if offered; likelihood of accepting an HPV test in the next three months if offered; and likelihood of accepting an HPV vaccination in the next three months if offered. The HPV test and vaccination and cervical screening-related items were drawn from the first and second studies in this series. The items examining intentions to speak to potential sexual partners were intended to assess behaviours with qualitatively

different costs than acceptance of an invasive procedure or drug (emotional rather than health-related potential costs), and the item on general STI testing intentions included for comparison with HPV test intentions. This instrument was administered both at baseline and following the presentation of information, and is shown in the context of the full questionnaire used in this study in Appendix 9 (p335).

7.2.4.6. Content evaluation responses

A semantic-differential scale was employed to measure content evaluation on ten dimensions. This instrument was modified from the one used in the previous chapter (as described on p168), and is shown in the context of the full questionnaire used in this study in Appendix 9 (p335). Data obtained using this instrument are used in two types of analysis: firstly as individual post-information outcomes to assess responses to presented information, and secondly in reliability and factor analyses in order to assess the instrument's utility in future studies. Eight of these dimensions were the same as in the previous study chapter; two further dimensions were devised and included, however, to reflect the increased focus on emotional and rational responses in this study (not factual/factual; unemotional/emotional). These items were coded in these analyses such that higher values represent higher amounts of the target construct, and therefore represent the following constructs: relevance, scariness, factuality, emotionality, reassuringness, interestingness, pleasantness, convincingness, novelty, and funniness. As per the aims of this study however, reliability and factor analyses of this scale carried out across the three experimental conditions assessed whether these directions are appropriate in terms of the underlying components accessed. A revised version of the instrument is described at the close of this chapter.

7.2.4.7. Emotional and rational responses

The REI-24 scale was administered at baseline in order to assess trait preferences for emotional or rational information. This instrument generates two separate subscales of rationality and experientiality, which can themselves be broken down into ability and favourability towards the specific cognitive style. Internal consistency estimates of

these scales by Norris and Epstein are not available, but in a sample of 399 respondents in a web-based study Novak and Hoffman (2007) showed reliabilities of more than .7 for all subscales with the exception of the Rational Ability subscale which had a marginal alpha (alpha=.67). Very similar reliability analyses were obtained in the current sample, with all subscales exceeding .7 with the exception of Rational Ability (alpha=.67).

An open-ended question, similar to the question of gist knowledge, was used to elicit statements about reception and metacognition of the material (*in the space below, please try to summarise your own response to the information in the leaflet in one short sentence)*. Responses on these items were subjected to a method of informal interpretation only. Because the responses may have been difficult to assign to a single grouping category and the number of participants in this study was limited, attempts at response grouping would likely lead to a sparsely populated list of categories. Responses were inspected and a list of tags generated to reflect the content of the responses; these were then applied throughout the list of responses. Each of these measures is shown in the context of the full questionnaire used in this study in Appendix 9 (p335).

7.2.5. Statistical methods and analysis

Repeated measures variables (i.e. those which were administered both at baseline and post-information) were analysed using mixed-design analyses of variance (ANOVA) with time of measurement as within-subjects factor and information condition as between-subjects factor. Significant interactions in this analysis were then further examined by using analyses of co-variance (ANCOVA) on the post-information variable while entering the baseline variable as a co-variate. This method permits the examination of planned comparisons. Single time-point measures were compared using single factor ANOVA. Factor analysis was also carried out on the items of the semantic-differential/content evaluation instrument. Factor analysis was used here because of the novelty of the instrument, and the utility of this method of analysis is to determine whether the variability of the items used may be explained by a lower

number of variables or factors, potentially indicating higher-order or latent psychological variables (Gorsuch, 1983).

7.3. Results

61 women participated in the study, with one excluded because of a low completion rate of the study's measures. 20 participants were allocated to each of the three information groups.

7.3.1. Hypothesis 1: Knowledge

It was hypothesised that knowledge would be higher in the group given HPV information compared to those groups given other forms of information.

Reliability estimations were carried out across all participants, and a Cronbach's alpha of .90 obtained. Participants scored an average of 12.01 (S.E. = .37) correct responses on the knowledge recognition scale measure in the HPV information group, compared with 7.15 (S.E. = .92) in the environmental information group and 7.45 (S.E. = 1.13) in the breast cancer information group. Knowledge measure scores showed significant effects by information condition, $F(2,57) = 10.36$, $p < .01$, with planned comparisons showing significantly higher scores in the HPV information condition as compared to the other sources: environmental information, $F(1, 57) = 16.07$, $p < .01$, breast cancer information, $F(1, 57) = 15.58$, $p < .01$..

7.3.2. Hypothesis 2: Affective states and responses

It was hypothesised that no changes in anxiety would be observed in relation to information presented.

Affective responses are summarised in Table 15 (p196). Short form STAI (examining state anxiety only) scores achieved acceptable levels of reliability (alpha = .79) although this is lower than the estimates of .83-.90 achieved during validation of the scale (Marteau and Bekker, 1992). The measure of trait anxiety, which was only used as possible predictor variable, achieved an estimate of .87. As per the controlled-materials study, trait anxiety means appeared to be slightly elevated above the means of around 36 shown in previous UK non-clinical samples (Mogg, Philipott & Bradley, 2004). State anxiety was also close to the population norm of 10.50 across all conditions. Randomisation between groups on the STAI also appeared to be successful: at baseline, no differences were shown between the three groups, F (2, 56) = .65, p = .52.

Table 15. Affective measures by information condition.

	Information condition							
	Environmental		Breast Cancer		HPV			
	Mean	SE	Mean	SE	Mean	SE	F	Sig.
Baseline STAI (range 6-24)	10.63	.60	11.40	.80	11.81	.77	.65	.52
Post-information STAI (range 6-24)	10.26	0.61	11.00	0.79	10.90	0.62	.34	.72

Post-information STAI scores were examined by single factor ANOVA to test for simple anxiety effects in response to the three information conditions. No significant differences were detected between the three groups of HPV/cervical cancer, breast cancer and environmental information: F (2,56) = .34, p = .72.

A mixed ANOVA was also carried out to examine possible effects of information condition on state anxiety over time. A 2 (pre-and post-information) by 3 (environmental, breast cancer or HPV/cervical cancer information) factor repeat-measures ANOVA was used to test for main effects of time and interactions between time and information condition. No interaction between time and information condition was observed, F (2,56) = .36, p = .70; or main effect of time, F (1,56) = 3.71, p = .06. When information conditions were not considered, overall anxiety dropped from an average of 11.29 (out of a possible 24) to 10.73 points over time.

7.3.3. Hypothesis 3: EPPM variables

It was hypothesised that HPV information would be rated as more threatening than breast cancer or environmental information using the RBDS, but also as more efficacious. Breast cancer information would also be rated as more threatening than environmental information.

Reliability analyses were carried out on the risk behaviour diagnosis scale, and these were split by the instrument's four subscales, and also by the threat/remedial targets that the scale was tailored towards in each experimental condition of information type. For the severity subscale, the environmental scale showed an estimated reliability of .74; the breast cancer scale, .56; the HPV scale, .68. For the susceptibility subscale, the environmental scale showed an estimated reliability of .79; the breast cancer scale, .86; the HPV scale, .68. For the response efficacy subscale, the environmental scale showed an estimated reliability of .92; the breast cancer scale, .75; the HPV scale, .84. For the self-efficacy subscale, the environmental scale showed an estimated reliability of .81; the breast cancer scale, .83; the HPV scale, .64. It should be noted that some of these estimates are marginal or poor; most notably the severity scale as relates to the version of the scale tailored to breast cancer, perhaps indicating that the subscale's items do not map well to this threat condition.

Table 16. Risk behaviour diagnosis scale responses by information condition.

	Information condition							
	Environmental [a]		Breast Cancer [b]		HPV [c]			
	Mean	SE	Mean	SE	Mean	SE	F	Sig.
Risk behaviour diagnosis/EPPM variables								
Threat	37.15 [bc]	1.01	27.75	1.14	29.33	0.95	22.73	.01
Efficacy	31.89 [bc]	1.59	26.00	1.89	26.95	1.47	3.52	.03
Critical value	-5.26	1.86	-1.75	2.66	-2.38	1.67	.76	.47

Superscript denotes significant difference with indicated group.

Responses on the RBDS are shown in Table 16 (p197). Significant effects were observed on both subscale variables.

In terms of the perceived threat of the target condition across the three conditions, a significant overall effect was observed, $F(2,57) = 22.73$, $p < .01$, and planned comparisons showed that threat was judged to be higher in the environmental information than the HPV/cervical cancer information, $F(1,57) = 28.19$, $p < .01$, and the breast cancer information, $F(1, 57) = 36.90$, $p < .01$. The same pattern was observed in terms of the perceived efficacy of the recommended response (across conditions, this would be recycling, mammography and HPV vaccination), with a significant overall effect observed, $F(1,57) = 3.52$, $p = .05$, and planned comparisons showing that efficacy was judged to be higher in the environmental information than the HPV/cervical cancer information, $F(1, 57) = 4.41$, $p < .01$, and the breast cancer information, $F(1, 57) = 4.53$, $p = .02$. With regards to the final critical value (which is derived from the threat and efficacy scores), no significant effects were shown, $F(1,57) = .76$, $p = .47$.

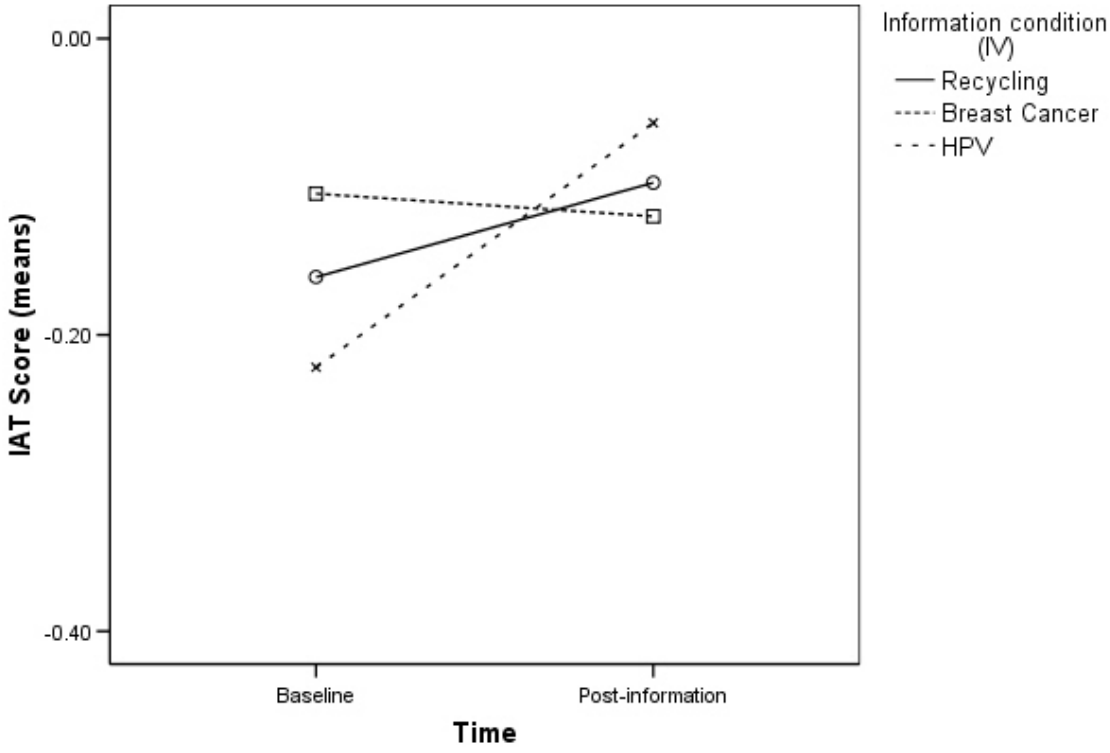
7.3.4. Hypothesis 4: Implicit associations

It was hypothesised that there would be an interaction between time of measurement and information condition on the implicit association test, with less evidence of performance increase over time in the breast cancer information group.

An analysis of variance was first carried out on the compound IAT scores generated by the implicit association test on the baseline scores in order to test for successful randomisation on this measure: no significant differences were detected between the three groups, indicating random allocation to the groups, $F(2, 57) = .42$, $p = .65$. A mixed ANOVA examining two levels of the repeated variable time (pre-test and post-test) and three levels of the between-subject variable information condition (environmental, breast cancer and HPV/cervical cancer information) was then carried out. Compound IAT scores provided an index of implicit associations between the target category of *cancer* and the evaluative categories of *positive* or *negative*, with negative (i.e. less than zero) means indicating stronger associations with the category *negative* and positive means (i.e. more than zero) indicating stronger associations with the category *positive*. The mean outcomes in this analysis are summarised in Figure 11 (p199). Despite this pattern of results, where the HPV and environmental information

groups appeared to show an increase over time and the breast cancer group a slight decline, a repeat measure ANOVA detected no significant interaction between time and information condition: F (2,57) = .99, p = .38. An analysis of covariance was also carried out on the post-information IAT score, with baseline IAT score entered as a covariate, and three levels of the between-subject variable information condition. No significant effect of information condition was detected here: F (2,57) = .55, p = .58.

Figure 11. IAT scores split by information condition and time of measurement.



7.3.5. Hypothesis 5: Behavioural intentions

It was hypothesised that HPV-related information would elicit greater positive changes in intentions than alternative forms of information.

Table 17. Behavioural responses by information condition.

	Information condition						Between group differences	
	Environmental		Breast Cancer		HPV/cervical cancer			
Scale range 1-7	Mean	SE	Mean	SE	Mean	SE	F	Sig.
Behavioural intentions (baseline)								
Talk to potential partners about STIs	5.53	.45	5.55	.36	5.86	.37	.23	.80
Talk to potential partners about HPV	3.83	.48	3.85	.49	3.48	.43	.21	.81
STI test intentions	4.58	.49	4.15	.56	3.81	.46	.58	.56
Smear test intentions	4.79	.49	5.50	.48	4.95	.44	.62	.54
HPV test intentions	4.56	.47	4.89	.51	4.38	.37	.35	.71
HPV vaccine intentions	4.17	.51	4.63	.54	4.67	.46	.30	.74
Behavioural intentions (post-information)								
Talk to potential partners about STIs	6.16	.34	5.75	.37	6.05	.27	.41	.67
Talk to potential partners about HPV	4.94	.52	4.74	.46	5.29	.44	.36	.70
STI test intentions	5.26	.43	4.40	.55	4.33	.51	1.03	.36
Smear test intentions	5.11	.48	5.70	.44	5.33	.42	.44	.64
HPV test intentions	4.89	.47	5.21	.50	5.38	.42	.29	.75
HPV vaccine intentions	4.42	.47	4.90	.51	5.76	.46	1.99	.15

Behavioural response at baseline and post-information are summarised in Table 17 (p200) and were examined initially via mixed-design ANOVA. Changes across these time-point measurements are summarised in Table 18 (p201). There were no significant between group differences in any intention measure at baseline or post-information. One intention item appeared to produce significant changes by time in relation to information condition however, and this was likelihood of accepting an HPV vaccination in the next three months if offered; this change over time is represented in

Figure 12 (p202). On this item the HPV/cervical cancer group showed a mean intention score (on a scale of 1-7) of 4.67, which rose to 5.76 at post-information. By contrast, the breast cancer group mean was 4.63 at baseline and 4.90 at post-information, and the environmental group 4.56 at baseline and 4.42 at post-information. An ANCOVA of post-information intentions on this item (controlling for baseline intentions) showed a significant effect of information condition: $F(2,57) = 3.95$, $p = .03$. In this analysis, planned comparisons showed that HPV information was associated with significantly higher intentions than either breast cancer, $F(1, 57) = .5.38$, $p = .024$, or environmental information, $F(1, 57) = 5.73$, $p = .02$. Note that a similar pattern, though one that is not significant, is observed on the HPV test intentions item, and this is shown in Figure 13 (p203). On this item the HPV/cervical cancer group showed a mean intention score (on a scale of 1-7) of 4.38, which rose to 5.38 at post-information. The breast cancer group mean was 4.89 at baseline and 5.21 at post-information, and the environmental group 4.56 at baseline and 4.89 at post-information.

Table 18. Changes in behavioural responses by information condition.

	Information condition						Between group differences	
	Environmental [a]		Breast Cancer [b]		HPV/cervical cancer [c]			
Scale range 1-7	Mean	SE	Mean	SE	Mean	SE	F	Sig.
Talk to potential partners about STIs	0.63	0.36	0.20	0.092	0.19	0.18	1.6	0.32
Talk to potential partners about HPV	1.11	0.38	1.05	0.386	1.81	0.39	1.24	0.30
STI test intentions	0.68	0.47	0.25	0.298	0.52	0.20	0.42	0.66
Smear test intentions	0.31	0.15	0.20	0.225	0.38	0.20	0.22	0.80
HPV test intentions	0.22	0.39	0.31	0.254	1.00	0.32	1.75	0.18
HPV vaccine intentions	0.16	0.33	0.16	0.115	1.10 [ab]	0.39	3.18	0.04

Superscript denotes significant differences with indicated group.

There were also a number of main effects of time (i.e. when information condition is not considered), with the descriptives presented in Table 18 (p201) showing that all are upward changes in intentions over time. Every intention variable examined shows this effect: intentions to speak to a potential partner about STIs, $F(2, 58) = 6.51$, $p = .01$ (mean at baseline is 5.65 and at post-information is 5.98) and HPV, $F(2, 58) = 35.28$, $p < .01$ (mean at baseline is 3.71 and at post-information is 5.00), acceptance of STI test, $F(2, 58) = 6.35$, $p = .02$ (mean at baseline is 4.71 and at post-information is 4.65), smear test, $F(2, 58) = 6.90$, $p = .01$ (mean at baseline is 5.08 and at post-information is

5.38), HPV test, F (2 ,58) = 7.38, p = .01 (mean at baseline is 4.60 and at post-information is 5.17) and HPV vaccination, F (2 ,58) = 7.06, p = .01 (mean at baseline is 4.50 and at post-information is 5.05).

Figure 12. Behavioural intention scores (item: likelihood of accepting HPV vaccination in the next three months if offered) split by information condition and time of measurement.

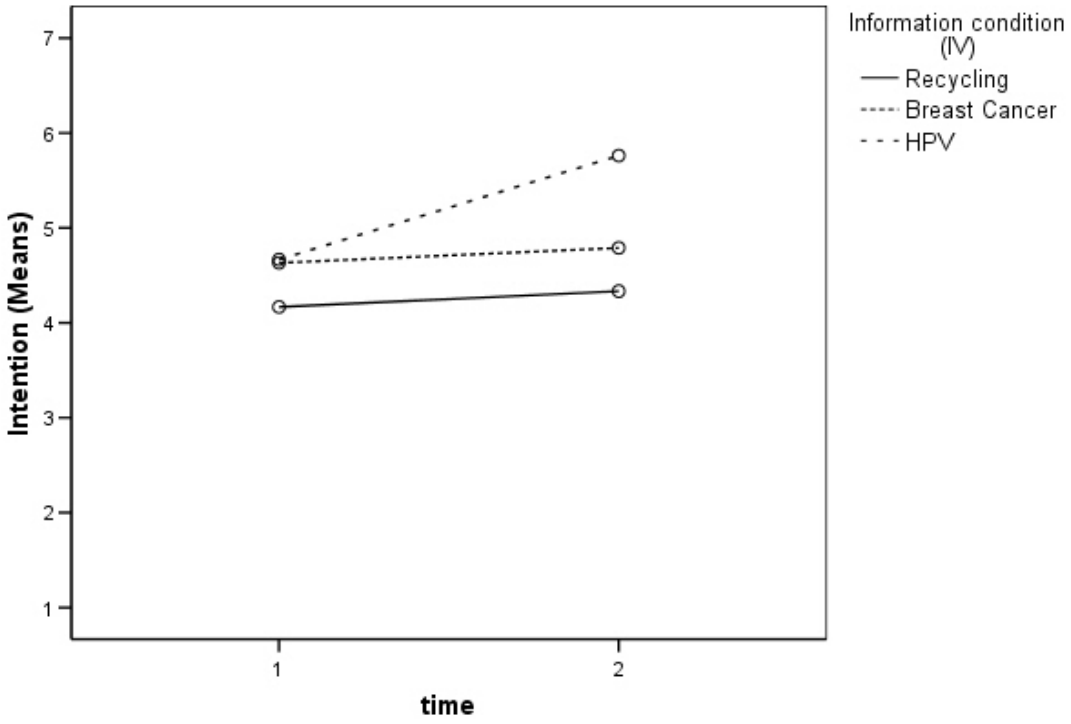
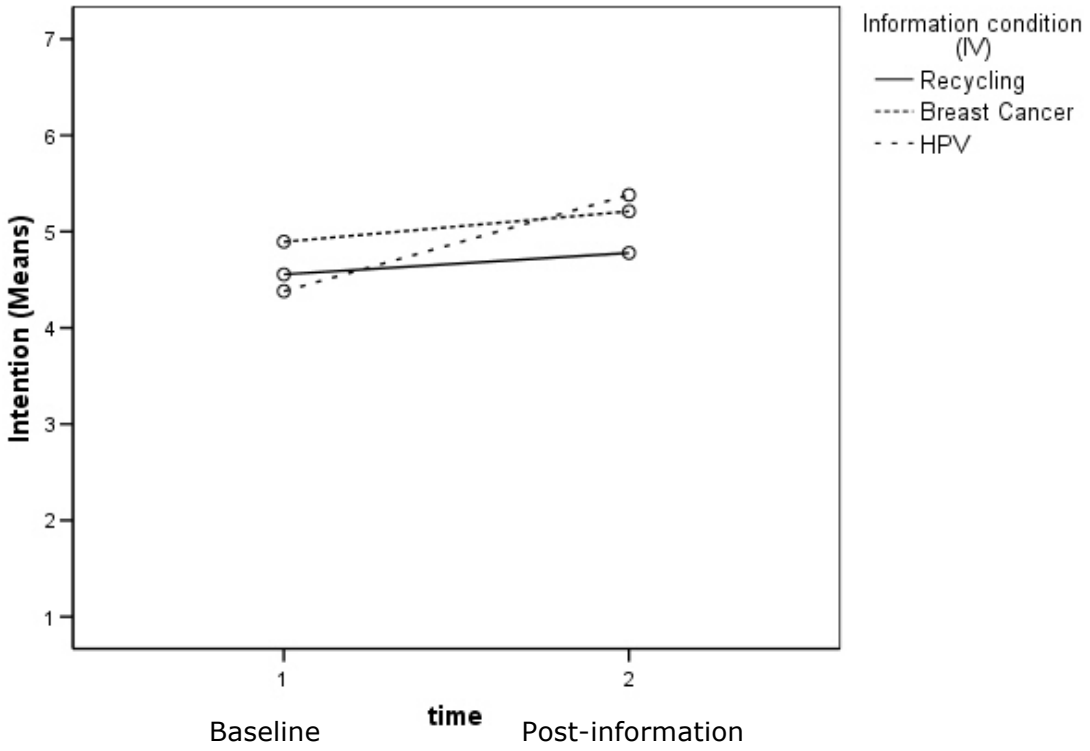


Figure 13. Behavioural intention scores (item: likelihood of accepting an HPV test in the next three months if offered) split by information condition and time of measurement.



7.3.6. Content evaluation responses

Results from the semantic-differential scale items are summarised in Table 19 (p204). In seven items (of scariness; factuality; emotionality; convincingness; funniness; pleasantness; interestingness) no significant differences were observed in terms of main effects. On the relevance item a significant effect of information condition was observed, $F(2,57) = 5.50$, $p = .01$, with planned comparisons revealing that HPV/cervical cancer was rated as significantly more relevant than the environmental information group, $F(1, 57) = 8.51$, $p < .01$. On the reassuringness item, a significant effect of information condition was observed, $F(2,57) = 4.44$, $p = .02$, and planned comparisons showed that the HPV/cervical cancer information was rated as

significantly more reassuring than the environmental information group, F (1, 57) = 7.31, p < .01. On the familiarity item a significant effect of information condition was observed, F (2,57) = 5.97, p = .01, and planned comparisons showed that the HPV/cervical cancer information was rated as significantly less familiar than both the environmental, F (1, 57) = 11.36, p < .01 and breast cancer , F (1, 57) = 5.26, p = .03, information groups.

Table 19. Evaluative responses by information condition.

Scoring range 1-8	Environmental [a]		Breast Cancer [b]		HPV				
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	F	Sig.	
Relevance	5.11	0.52	6.75	0.34	6.76	0.34	(2, 57) 5.50	.01	a
Scariness	3.68	0.55	3.65	0.46	4.29	0.47	(2, 57) .54	.59	
Factuality	7.37	0.28	7.15	0.24	7.24	0.19	(2, 57) .21	.81	
Emotionality	3.58	0.55	2.95	2.19	2.95	0.35	(2, 57) .68	.51	
Reassuringness	4.00	0.45	5.50	0.43	5.62	0.39	(2, 57) 4.44	.02	a
Interestingness	6.21	0.33	6.45	0.32	7.10	0.27	(2, 57) 2.28	.11	
Pleasantness	4.16	0.38	3.75	0.29	4.67	0.19	(2, 57) 2.55	.09	
Convincingness	6.42	0.25	6.25	0.35	6.71	0.20	(2, 57) .76	.47	
Familiarity	6.37	0.31	5.70	0.43	4.33	0.50	(2, 57) 5.97	.01	ab
Funniness	1.89	0.30	1.35	0.17	1.52	0.15	(2, 57) 1.66	.20	

Superscript denotes significant planned comparisons between the HPV information group and the indicated control group(s), p>. 05

7.3.6.1. Reliability and factor analysis

The purpose of these analyses was to examine the internal consistency of the items used in the semantic differential instrument, and to examine whether distinct components emerged which may be useful in future research. A poor Cronbach alpha coefficient of .40 was obtained for the 10-item scale as used in the previous between group analyses.

These items were subjected to Principal components analysis (PCA). Prior to this, data suitability assessments were carried out: the Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ($p. < .01$), and a number of coefficients within the correlation matrix reached .3 and above. The Kaiser-Meyer-Oklin value, at .53, was lower than the recommended value of .60 however, and the analyses reported here should therefore be considered as exploratory investigations ahead of the use of the instrument with a larger sample. PCA revealed the presence of four components with initial eigenvalues exceeding 1, explaining 23%, 19%, 13% and 11% of the total variance respectively (see Table 20, p206). Inspection of the screeplot (see Figure 14, p207) indicated clear breaks after the first and second components, and it was decided to retain these two components for further analysis (although the third and fourth components also explained substantial variance, items on these components overlapped with others in the instrument). Two items – pleasantness and familiarity - were also identified as negatively loading on these components; it was thought that reverse coding these items would make the results simpler to interpret for future use, and so the final analysis was conducted with these reverse coded scores (therefore producing the same values). The items for the final instrument were therefore unpleasantness and novelty.

To aid in the interpretation of these two components, Varimax rotation was performed, with the rotated two-component solution accounting for 36.40% of the variance, with Component 1 contributing 19.23% and Component 2 contributing 17.21%. Interpretation of these two compound variables seemed to be consistent with labels of *emotional* versus *deliberate*, with Component 1 being formed of the variables assessing unpleasantness, scariness and emotionality, and Component 2 of novelty, reassuringness and interestingness (see Table 21, p206).

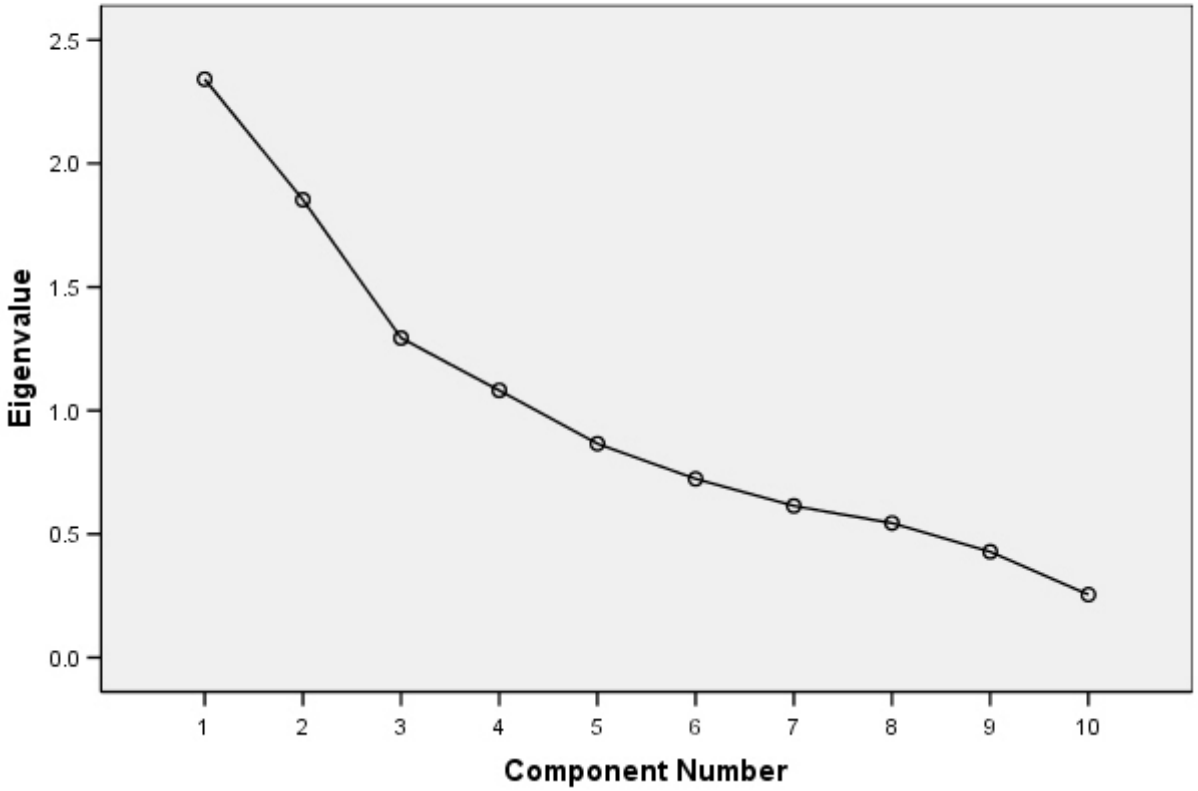
Table 20. Eigenvalues and explained variance for semantic differential instrument items.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.34	23.41	23.41	2.34	23.41	23.41	1.92	19.18	19.18
2	1.85	18.53	41.94	1.85	18.53	41.94	1.72	17.18	36.40
3	1.29	12.93	54.87	1.29	12.93	54.87	1.62	16.19	52.55
4	1.08	10.81	65.69	1.08	10.82	65.69	1.31	13.14	65.69
5	.87	8.66	74.35						
6	.72	7.23	81.58						
7	.61	6.14	87.72						
8	.55	5.45	93.17						
9	.43	4.29	97.45						
10	.26	2.55	100.00						

Table 21. Pattern/structure for coefficients of semantic differential instrument items.

	Component 1 Emotional dimension	Component 2 Deliberate dimension
Unpleasantness	.73	-.33
Scariness	.85	.01
Emotionality	.56	.09
Interestingness	.34	.46
Reassuringness	-.28	.75
Novelty	-.04	.83
% of variance explained	19.18%	17.18

Figure 14. Scree plot for principal components analysis of semantic differential instrument.



7.3.6.2. Emotional/deliberate content evaluation analysis

The two resultant subscales of the semantic-differential instrument were also used as measures of response to the information materials. One-way ANOVAs were used to examine the effects of three levels of the between-subject variable information condition (environmental, breast cancer and HPV/cervical cancer information; means shown in Table 22, p208). No significant effects were observed on the *emotional* evaluation subscale, F (2,57) = .081, p = .92; but significant effects of information condition were observed on the *deliberate* evaluation dimension, F (2,57) = 7.59, p = .01. Post-hoc tests showed that this effect was largely due to higher deliberate evaluations of the HPV/cervical cancer group compared to the environmental group, F(1, 57) = 15.17, p. <.01.

Table 22. Emotional/deliberate content evaluations by information condition.

	Information condition						Between group differences	
	Environmental		Breast Cancer		HPV/cervical cancer			
Scale range 3-24	Mean	SE	Mean	SE	Mean	SE	F	Sig.
Emotional evaluation	12.82	1.18	11.85	.80	11.57	.82	.08	.92
Deliberate evaluation	12.84	.73	15.25	.79	17.38	.91	7.59	.00

7.3.7. Open-ended responses

Written open-ended responses to the information sources are shown in appendix 10. Inspection of these data suggested a number of 'tags' to reflect the generated responses, and these are summarised in Table 23 (p210), where they are split by the 'gist' or meta-cognition questions. It was observed that across the two questions there was some overlap between the tags, and therefore in Table 24 (p211) they are presented as combined across the two open-ended questions.

A number of patterns can be observed across the measures. More specific facts are recalled in the health-related groups, and more general ones in the environmental group. More positive responses are observed on the health related information as compared to the environmental information. The health related groups also mention more of those responses which are more commonly associated with decision-making

than do the environmental group: prevention of negative effects and risk/general prevalence. Environmental and HPV information appeared to be more associated with responses that reflected on the participant's own behaviour than breast cancer information. There are few mentions of familiarity or novelty of the information across the groups, and some indication that the statistical content of the breast cancer information stood out more so than in the other groups. The environmental information group was also the most likely to consider the information as providing judgement on their own behaviour.

Table 23. Frequencies of tags applied to open-ended responses by prompt and information condition.

		Gist recall			Meta-cognition response		
Label	Description	Environmental	Breast Cancer	HPV / Cervical cancer	Environmental	Breast Cancer	HPV / Cervical cancer
Evaluation-positive	Positive evaluation of the leaflet's contents	0	0	0	2	9	8
Evaluation-negative	Negative evaluation of the leaflet's contents	0	0	0	2	0	0
Judgemental	Perceived evaluative comment on behaviours or attitudes	8	0	0	0	0	0
Factual-general	Mentioned inclusion of facts of factual information, but did not necessarily recount them	12	7	2	0	1	0
Factual-specific	Recounted specific facts	3	11	17	0	0	0
Behaviour-self	Related information to own behaviour or behavioural intentions	0	0	0	11	3	8
Behaviour-other	Related information to behaviour of others	0	0	2	3	1	1
Cause-effect	Explicitly linked causes of threat condition	5	5	12	2	0	1
Emotional-positive	Positive emotional responses	0	0	0	3	3	3
Emotional-negative	Negative emotional responses	0	0	0	1	4	1
Statistics	Specific numerical facts recounted	0	5	0	0	1	1
Risk	Mentions own risk or general prevalence	0	8	9	0	4	9
Prevention	Mentions prevention and/or treatment	4	9	12	0	3	0
Familiarity	Prior knowledge of information	0	0	0	3	2	0

Table 24. Frequencies of tags applied to open-ended responses by information condition and combined across prompts.

Label	Description	Environmental	Breast Cancer	HPV / Cervical cancer
Evaluation-positive	Positive evaluation of the leaflet's contents	2	9	8
Evaluation-negative	Negative evaluation of the leaflet's contents	2	0	0
Judgemental-other	Perceived evaluative comment on behaviours or attitudes	8	0	0
Factual-general	Mentioned inclusion of facts of factual information, but did not necessarily recount them	12	8	2
Factual-specific	Recounted specific facts	3	11	17
Behaviour-self	Related information to own behaviour or behavioural intentions	11	3	8
Behaviour-other	Related information to behaviour of others	3	1	3
Cause-effect	Mentioned relationship between behaviour and threat condition	7	5	13
Emotional-Positive	Positive emotional responses	3	3	3
Emotional-negative	Negative emotional responses	1	4	1
Statistics	Specific numerical facts recounted	0	6	1
Risk	Mentions own risk or general prevalance	0	12	18
Prevention	Mentions prevention and/or treatment	4	12	12
Novelty		0	0	1
Familiarity		3	2	0

7.4. Discussion

This study has attempted to refine the paradigm used across this experimental series, to ensure that the methods employed can be further developed in future research (along with providing indicators of possible directions that this research may take), and to answer a number of questions relating to the implicit association test.

Basic outcome measures were similar to those observed in previous studies. Recognition knowledge of HPV information was boosted by presentation of an HPV information source (p195; similar to the results in Chapters 4, 5, and 6, respectively p118, p142 and p169). Anxiety, again, did not appear to show sensitivity to the presented information materials (p195; in line with the results in Chapters 4, 5 and 6, respectively p119, p142 and p170).

Factor analysis of the semantic differential instrument as introduced in the controlled-materials study (see p160 for discussion of the relevant literature) however revealed two 3-item subscales assessing emotional and deliberate evaluations of content. Findings showed that the emotional scale was less affected by the type of information presented than the deliberate scale, suggesting that the overall pattern of response to the materials provided is mainly analytical.

Explicit evaluations of information materials on the variables specified by the EPPM appeared sensitive to differences in the type of information given, but in line with the controlled-materials study (in the results reported on p171), HPV and breast cancer information was rated as surprisingly unthreatening and non-efficacious in comparison to environmental information. Therefore the results obtained on the variables of the EPPM largely replicated the results of the previous study and those of Smith et al. (2009), and again contravening the hypothesis that HPV information would be rated as the most threatening due to the presence of both cancer and sexual transmission information. Similarly, breast cancer information was also rated as less threatening than environmental information despite the presence of cancer information in this material. Efficacy on the other hand was again lowest with respect to breast cancer

information (although not significantly so in comparison with the HPV information condition, which is in contrast with the results of the controlled-materials study).

A more thorough examination of changes in behavioural intentions was undertaken in this study, permitting repeated measures analyses. While few effects were shown, a small boost in HPV-related intentions was observed over time and this was in line with this study's hypotheses. Measures of behavioural intentions were used in the first two studies of this experimental series: in the study of adolescent age females, a demonstrable boost in intentions relating to HPV vaccination and cervical cancer screening by presentation of health information was shown (see p122), with similar results shown in the succeeding study (see p149). Behavioural intentions in general appeared more difficult to modify in the present study when measured using repeated measures on a range of behavioural intentions, and showed only moderate changes in response to the independent variable of information condition (even less so than in previous studies in this series). Considering scores at the post-information phase only, no effects by independent variable were observed, and even when considering changes in behavioural intention, only one variable (willingness to be vaccinated against HPV) showed significant effect by information condition. Use of a repeated measures method in examining behavioural intentions, however, reveals an important finding that would not have been evident if looking only at post-information intentions: stronger intentions to accept HPV vaccination after the presentation of HPV-specific information (which is also significant when examining the post-information score while controlling for the baseline score). As well as those results shown in the previous studies, these findings support a number of previous studies (Chan et al., 2009; Davis et al., 2004; Dempsey et al., 2006)|.

In terms of implicit associations, result were similar to the results presented in Chapter 5; although a similar pattern of responding was shown in response to the three information sources, the differences between them did not reach significance levels. A number of previous studies have demonstrated changes in implicit associations over time (e.g. Karpinski & Hilton, 2001a; Olson & Fazio, 2001; Petty et al., 2008) but in the main these have used repetitive training techniques in which valenced and neutral stimuli were paired over hundreds of presentations; the findings of this and the university-age sample study are distinct from these in that the motivator of implicit

association change was reading of a short print information source. One previous study (Foroni & Mayr, 2005) has also shown changes over time in implicit associations in response to a single reading of a relevant scenario, but this study did not examine concurrent changes in any other explicit variables. It is difficult to conclude from the findings of these studies whether changes in implicit cancer associations can emerge in response to a short print information source. Looking across the three uses of the SC-IAT in this experimental series, there does not seem to be a clear pattern of changes in implicit associations in response to health information, though there are clearly a number of changes over time. Possible future research directions are considered in Chapter 8 (p241). The results obtained on the implicit association test in this study fit well with those of the previous two studies. Using controlled content in a more naturalistic presentation format, it was expected that a pattern of results would be obtained that was closer to those of the naturalistic than the controlled-materials study, based on the suggestion that the style and format – that is, the surface aspects - of the information source may be able to impact upon implicit associations in a way that the content does not. In part, these expectations were borne out; the pattern of results obtained appeared to share more superficial characteristics with those observed in the naturalistic-materials study, with less levelling out of implicit evaluations in the non-breast cancer linked groups. Care should be taken in interpreting these findings however because the between group differences do not reach statistical significance. Though some significant effects and patterns have emerged in this series, the impact of learning effects and regression to means must be considered in further studies of implicit cancer associations. Sample size and randomisation may have also been responsible for a number of the effects shown here; there were indications in the first and third studies in particular that the three groups differed at baseline.

Also included in this study were two open-ended questions in which participants were asked to provide their own *gist* understanding of the information provided as well as a short personal response to it. These were based on questions used by Rothman et al. (1999). A formal qualitative analysis of these responses was not made, as the given answers were diverse and clear patterns did not emerge through the dataset. However, inspection of these descriptive frequencies of the classified response types may provide indications as to improving this type of measure in the future, as well as creating new measures of meta-cognition. With respect to the gist question, participants interpreted

the given information in a variety of ways; as a direct command to carry out a specified behaviour, a rebuke to the wider population, a non-specific set of facts, or singling out specific facts or statistics.

With regard to the personal response item, many respondents tended to produce an evaluation of the information, where descriptive showed that more positive evaluations of the breast cancer and HPV/cervical cancer sources were observed, indicating again that it is possible for information that concerns a superficially negative topic to receive a positive evaluation. This is in line with those mixed responses to HPV information as demonstrated in qualitative studies (e.g. Waller et al., 2006; see also those studies reviewed in section 1.3.6.2, p37). Participants tended to remember fewer specific facts in the environmental group than the cancer information groups (and more in the HPV/cervical cancer group than the breast cancer group). These often related to risk or prevalence (indeed risk tags were far more common in the cancer information groups); in line with the principles of the EPPM, perceived risk and susceptibility could represent a key determinant of engagement with the processing of the information here. It may be that environmental threats are perceived as less tangible than health threats.

One conclusion that can be drawn from the use of the open-ended measures is that people do not tend to categorise their own responses in terms that correspond easily with an emotional versus deliberate model (in that the themes that emerged in these findings did not cluster into these two groups). This appears to be in contrast with the findings obtained with the semantic-differential instrument, which could be organised into two variables that corresponded with an emotional versus deliberate approach, and it may be that there is a discrepancy between self-report and objective measures here. The practical implication of this may be that self-report or other qualitative methods may not be useful methods of ascertaining whether an individual is responding in a way that can be considered emotional versus deliberative; a more objective assessment is necessary.

7.6.1. Limitations

It has already been mentioned that the sample size was below the a priori sample size generated by power calculations, and this leads to several uncertainties regarding the borderline and non-significant effects observed in this study; most notably the within-between interaction in the implicit measures. Lack of power may have also been an issue in analysing the results on the RDBS scale measures; though consistent directions of effect were shown across the two studies using these variables, effects were small. Another significant criticism may be that more pretesting of materials should have been carried out.

The conclusions drawn from use of the implicit association test can also be criticised; comparing these results with those from the earlier studies are problematic because alternate evaluative categories were used. The following chapter will examine the possibility that the evaluative categories elicited different patterns of performance by comparing performance across the studies reported in this thesis.

7.4.2. Conclusion

This study has attempted to replicate and extend the results of the earlier studies on a number of measures using a set of information materials that contain elements drawn from both the naturalistic and controlled-materials studies. In line with predictions, relevant knowledge can be boosted by information provision, and moods are resistant to change. Implicit associations also show some changes, and considered in conjunction with the earlier studies, indicate that this may result from the stylistic and visual differences rather than content differences. Behavioural intention changes are again moderate, but appear to be sensitive to the given information over time in some cases. Threat and efficacy perceptions produced few clear indications of how danger or fear control states determined responses to the information sources; however there were a number of interactions between these variables and cancer attitudes, trait rationality/experientiality and mood. Explicit evaluations of the information sources

also appeared to fit into a framework of emotional versus deliberate (or rational) evaluations.

8. Implicit associations: cross-study analyses of correlates and category labels

The purpose of this chapter is to present a number of analyses that compare data from across the individual studies that make up this thesis and examine two outstanding questions relating to the implicit association test (IAT). The IAT measure is the most unconventional of the measures used in the paradigm developed here, and has brought methodological and theoretical challenges, including use of the test to study a concept which is associated with a strong negative evaluative response, as demonstrated in each of the test's previous uses in this series (see IAT results reported on p144, p173 and p198). The remainder of this chapter is split into two sets of analyses. The first examines the possibility that changing evaluative labels in the single-category IAT impacts performance. The second examines behavioural, affective, cognitive and attitudinal correlates of implicit associations in the context of cancer information processing.

8.1. Comparing category labels in the single-category IAT

8.1.1. Introduction

In the final version of the testing paradigm employed in the previous chapter (as described on p192), the IAT measure was modified to use a simpler set of category labels: that of *positive* versus *negative* rather than *funny* versus *scary*. The purpose of this modification was to show that performance on the test was not simply an artefact of the labels used; however, confidence in interpretation of the results of that study were also weakened by this modification, as the study's hypotheses were generated on the basis of earlier findings using the *scary/funny* category labels. It remains to be seen, then, whether use of these two sets of labels results in significantly different patterns of performance. Despite the vast number of studies carried out using IAT-related methods, none have specifically addressed the role of category labels, and the current application of the test is especially unique as it uses a single category IAT (Karpinski & Steinman, 2006). Use of this variation of the IAT reduces the complexity of the test's

design, such that only a single target category is used. In a review of the uses of the IAT in five years of research and guide to future applications, Greenwald et al. (2003) suggest that variations in category labels are unlikely to play an extensive role in differences between various IAT implementations, although it is unclear as to whether this is based on specific research data or general observations of findings. Mitchell et al. (2003) provide an indication that variations in evaluative categories could affect results on implicit measures: the authors suggest that implicit measures are inherently flexible, and so variations on any aspect of the task could impact upon outcomes. Over four studies, the authors show that subtle contextual cues (such as category distinctiveness) in both target and evaluative categories can have significant effects on task performance.

Though there is little previous evidence to suggest whether differences between these two label types will be observed, one study (Mitchell et al., 2003) has observed contextual differences in IAT performance. There is no evidence to suggest the direction of this effect, however. Nosek (2005) also notes that evaluative strength and category distinctiveness are shown to be moderators of relationships between implicit measures and explicit attitudes in a large sample of participants. The current study provides an opportunity for making a relatively simple comparison of IAT performance with two different sets of category labels.

8.1.1.1. Aim

This study examines the specificity of labels in an IAT-type paradigm. A comparison between the implicit measures used in Chapter 8 of this thesis and those used in Chapters 6 and 7 provides an opportunity to examine whether different evaluative category labels produce differences in implicit associations, by attempting to ascertain whether *scary/funny* produces different implicit associations with cancer than does *positive/negative*. One previous study has shown variations in IAT performance relating to the context of the task, and so differences are predicted here; there is no previous evidence to suggest the direction of effect in this case however, so none is predicted at this stage.

8.1.1.2. Hypothesis

It was hypothesised that significantly different IAT scores would be observed when the evaluative labels of *scary* and *funny* were used as compared to *negative* and *positive*.

8.1.2. Method

Baseline IAT results were compared across the studies presented in Chapters 6 and 7; the data from Chapter 5 was excluded because of a small difference in testing protocol in this study, along with the problematic baseline differences in that study. Analyses were conducted of not only the overall compound IAT score measure, but also the raw component scores measuring target-positive and target-negative valence pairings. These component outcomes have one disadvantage in that they are not subject to the *d* score transformation which is used to scale responses based on overall response speed; they do, however, allow an examination of implicit processes based on two dimensions alongside the single compound score (and therefore analysis of the individual labels).

8.1.3. Results

See Table 25 (p221) for a summary of findings. No significant differences were observed on adjusted response times between label conditions on the compound IAT measure: $F(1, 125) = .13$, $p = .72$. Significant differences were observed on the raw component measure of target-positive trials, however, with the trials using *funny/scary* labels showing significant higher response times than those using the labels *positive/negative*: $F(1, 125) = 4.91$, $p = .03$. Differences were also observed on the measure of responding in target-negative trials, again with the trials using *funny/scary* labels showing significant higher response times than those using the labels *positive/negative.* This effect did not reach 95% significance levels however: $F(1, 125) = 3.61$, $p = .07$.

Table 25. Adjusted response times on baseline SC-IAT tasks split by label type (n = 145).

	Label Type		Differences	
Adjusted response times (ms)	Funny/Scary	Positive/Negative	F Value	P-value
Target-Positive	.73	.68	4.91	.03
Target-Negative	.69	.65	3.61	.07
IAT Score	-.19	-.16	.13	.72

8.1.4. Discussion

These analyses were motivated by the switch to the evaluative categories of positive and negative (from funny and scary) between Chapters 6 and 7, the purpose of which was to address concerns that the previously-used labels may be inappropriate for assessing cancer associations. The goal here was to examine whether this switch made a difference to outcomes at baseline (and across all three information condition groups, as no treatment was administered at baseline). Little earlier evidence had examined this issue, with the creators of the IAT suggesting that no important differences should be observed when using alternative evaluative categories (Greenwald et al., 2003); however other evidence (Mitchell et al., 2003; Nosek et al, 2005) had provided indications that even minor variations in the specific setup of the task may impact performance. It was observed that using the alternate set of category labels did not make a significant difference to the compound IAT scores used for analysis in Chapters 6 and 7, suggesting that the analyses reported in those chapters would not be affected by any switches between these categories, but that there were differences in the variables used to calculate the compound IAT score.

Reassuringly, this is in line with the suggestion by Greenwald et al. (2003) that changes in evaluative labels do not have a crucial impact upon task performance, and this finding lends support to this statement. The compound IAT score, as set out in the controlled-environment studies, is calculated by examining the differences between response times on target-negative and target-positive trial blocks, and is the key outcome in most IAT studies. Analysis of response times on these two variables that

constitute the IAT score demonstrate an intriguing pattern: differences between evaluative label sets are shown on target positive block response time means. A difference approaching significance is also observed on target-negative block response time means (although this did not reach a 95% level of confidence). In both cases, higher response times are observed on the *funny*/*scary* label set. This therefore explains why significant effects are observed on these variables but not the compound IAT score; the differences are negated when these scores are combined.

Although not problematic for the analyses reported elsewhere in this thesis, these findings are of interest with respect to not only functional character of the IAT, but also perhaps the nature of the associations that people hold toward cancer. The data shows that use of more generic evaluative labels results in faster overall responding. One hypothesis may be that more generic evaluative labels are simply easier for individuals to process and therefore permit faster execution of the IAT. By a network/associative cognition account, it might be suggested that the network nodes for generic evaluative concepts (such as *positivity* and *negativity*, which may be termed *properties*) have more associative strength with a wide range of other non-property-type nodes than do more specific property nodes (such as *scary* and *funny*). By this token, the findings are also in line with other previous research: Mitchell et al. (2003) showed that IAT outcomes are sensitive to subtle variations in task design (including selection of appropriate evaluative and target categories) and Nosek et al. (2005) cited evaluative strength and category distinctiveness as moderators of relationships between implicit and explicit variables. The current findings therefore find common ground between these studies and that of Greenwald et al. (2003), and are reassuring for the earlier results in this study: although IAT outcomes can be sensitive to minor variations in task design (such as evaluative category selection), the robustness of the compound IAT score appears to account for these effects.

8.2. Correlates of implicit measures

8.2.1. Introduction

It was noted in the earlier review of previous research that many variables in response-evaluation studies may be used as either outcomes or predictors/correlates of other variables, and in some cases both. The studies presented up until this point have largely treated implicit measures as outcomes only. The purpose of this section is to examine associations between implicit and explicit measures in the previous three studies (all of which employed an IAT measure).

As was covered in Chapter 2, a number of theoretical, attitude-focussed accounts of human behaviour specify roles for both implicit associations and explicit attitudes (e.g. Strack & Deutsch, 2004; Fazio & Olson, 2003), and there is some evidence suggesting that implicit associations can be used to predict relevant behaviours (see section 2.2.2, p55, and 2.2.3, p60). Hofmann et al. (2005a) conducted a meta-analysis of 126 studies using an IAT alongside measures of behaviour, and reported an overall effect size of .24 for associations between the two types of measure. Greenwald et al. (2009b), in a similar meta-analysis of 122 studies, also demonstrated slightly higher predictive validity for behaviour by IAT scores than certain measures of equivalent explicit/self-report constructs; for example, in terms of interracial behaviours or intergroup interactions. Overall predictive validity was higher for self-report measures on behaviour overall (.36 as opposed to .27 for implicit measures) but showed much greater variation depending on the relationship under study. Smaller studies have also shown relevant associations between implicit measures and behaviour in health research: Richetin et al. (2007b) found that an IAT designed to assess implicit food preferences did not necessarily show any associations with equivalent explicit attitudinal measures, but that an additive model including both implicit and explicit predictors provided the superior method of predicting subsequent behaviour across four studies. IAT results alone produced a beta value of .39 in predicating behaviour choice. Similar associations were shown by Maison et al. (2001) and Friese et al. (2008), though as concluded in section 2.2.3, evidence is largely mixed on whether behaviours

can be predicted by implicit measures in any straightforward way: Karpinksi and Hilton (2001) showed no such associations, and the aforementioned meta-analyses included many studies that showed non-significant associations.

There is also limited evidence that there are relationships between implicit and explicit measures of personality dispositions, such as anxiety. Nosek et al. (2002) show a relationship in terms of measures of implicit and explicit self-esteem, and Egloff and Schmukle (2002) have also shown weak positive correlations between implicit and explicit measures of anxiety. Egloff, Weck and Schmukle (2007) showed an even weaker correlation, but also that this relationship could be strengthened by having participants think about anxiety. In sum, there are indications that implicit and explicit measures of dispositions show associations, but evidence is generally mixed or weak, and lacking.

The overall aims of this thesis, however, are more related to understanding the pathway of psychological events that spans information presentation and uptake, through to possible attitude change and subsequent behaviour change Including a wide range of measures alongside the IAT presents an opportunity to explore relationships in an information provision context. One study has partially addressed these issues by examining moderators between implicit attitudes and behaviours: Conner et al. (2007)showed that habit-formation variables appeared to affect the relationships between implicit variables and behaviour, and 'need for cognition' factors (which assess trait-based preferences for engaging in deliberate processing) to affect the relationships between explicit variables and behaviour. The analyses to be presented in this chapter are therefore largely exploratory because there is no data available relating to the implicit evaluation of diseases (e.g. cancer), and because the nature of the associations between some implicit and behavioural intention measures are difficult to predict. The role of implicit associations in cancer-related behaviours and responses has not been well explored.

8.2.1.1. Aims

Over the course of these studies, the response measures used have been split in terms of whether they are affective, behavioural, cognitive (knowledge-based) or attitudinal in nature. Four hypotheses are therefore presented. The default position from which these hypotheses are set is that implicit measures will show associations with explicit measures, as little previous data is available to suggest which of these variables should show associations and which should not. Where appropriate and available, change variables are examined; for example, changes in anxiety over time.

A relationship between changes in implicit associations and behavioural intentions is predicted, but this may be a positive or negative association. It may be that more positive evaluation of cancer represents the lifting of a barrier to intention, or that more negative evaluation represents greater implicit anxiety and/or threat perceptions as motivators to action. These analyses were conducted across all information conditions. An association between knowledge of HPV and baseline IAT score is predicted, but again a direction of effect is not specified here. Implicit cancer associations at baseline may have a negative or positive impact on knowledge uptake. In terms of affect, it may be assumed that changes in affect are mirrored by changes in cancer-related associations: improvements over time in affect should be matched by equivalent changes in associations, and vice versa. Finally, the current study examines the hypothesis that implicit and explicit attitudes about cancer will follow the same pattern of responses: explicit cancer-related attitudes should therefore show a positive association with implicit cancer attitudes at baseline.

8.2.1.1. Hypotheses

1. There should be a significant correlation between changes in implicit associations and changes in behavioural intentions (as measured in Chapter 8's study only).
2. It was hypothesised that knowledge scores would show a significant correlation with baseline IAT scores in those participants given HPV/cervical cancer information.

3. It was hypothesised that changes in implicit cancer associations would show a significant positive correlation changes in affect in those participants given cancer-related information only.
4. It was hypothesised that implicit cancer associations would show a significant positive correlation with explicit cancer-related attitudes.

8.2.2. Method

8.2.2.1. Measures and statistical analyses

Correlations between the IAT measures and a number of explicit measures were examined in line with the hypotheses outlined above. Data were used from across three studies, and were treated as independent replications were appropriate due to the slight variations in methods used. Each of the four hypotheses was tested via examination of correlations between the IAT and one of four classes of measure: behavioural intentions, knowledge, explicit measures of affect, and explicit measures of attitudes.

8.2.3. Results

8.2.3.1. Behavioural intention measures and IAT scores

A summary of these analyses can be observed in Table 26 (p227) and an overview of associations meeting or approaching significance is provided here.

Correlations between changes in behavioural intentions and implicit associations indicated two trends, both in terms of HPV-related intentions. A positive correlation between changes in IAT score and changes in willingness to speak to a partner about HPV was observed: $r(21) = .25$, $p = .04$. A non-significant trend was also shown in terms of HPV vaccination willingness: $r(21) = .26$, $p = .06$. In both cases, more

positive changes in implicit cancer associations were correlated with more positive changes in behavioural intent.

Table 26. Associations between implicit measures and behavioural intentions in participants given HPV/cervical cancer information in Chapter 7.

Correlating variables		Pearson r2	Sig
Variable 1	Variable 2		
IAT score change	HPV Vaccination	.24	.06 *
IAT score change	HPV test	-.05	.72
IAT score change	Cervical screening	.04	.76
IAT score change	STI Test	.17	.20
IAT score change	Talk about HPV	.27	.04 **
IAT score change	Talk about STIs	.13	.32

* indicates weak or borderline associations.

** indicates significant associations at $p < .05$

8.2.3.2. Knowledge uptake and IAT scores

All analyses were restricted to those participants given HPV/cervical cancer information. Results from Chapter 5 were first examined. Participants with higher scores on the recognition measure of HPV knowledge showed more positive implicit cancer associations at baseline, although this was not significant at .05: $r(24) = .39$, $p = .06$. No associations were shown between implicit measures and the number of items recalled.

No significant association between recognition knowledge and baseline IAT scores were observed in Chapter 6's results, although a moderate positive correlation was shown between baseline IAT scores and numbers of items recalled, where participants recalling more items showed more positive implicit cancer associations at baseline. This effect did not reach .05 significance however: $r(22) = .34$, $p = .14$.

Neither effect was replicated in Chapter 7's data; neither the recognition knowledge measure nor the recall measure showed a significant association with IAT measures at baseline.

8.2.3.3. Explicit measures of anxiety and IAT scores

Associations between changes in affective and implicit responses were examined by performing correlation analyses on changes in IAT and STAI measures. No correlations between these measures were observed in either Chapters 5, 6 or 7: respectively, r (45) = -.08, p = .56; r (42) = .090 p = .56; r (40) = .02, p = .90.

8.2.3.4. Explicit measures of attitudes and IAT scores

A summary of these analyses can be observed in Table 27 (p228), where it can be seen that of the various measures of explicit attitudes used across the three chapters, no substantial association effects are observed.

Table27. Associations between baseline implicit measures and explicit measures of attitudes.

Correlating variables		Chapter 6		Chapter 7	
Variable 1	Variable 2	Pearson r2	Sig (p)	Pearson r2	Sig (p)
Baseline IAT score	Cancer Fear (Champion)	-.02	.85	--	--
Baseline IAT score	Cancer stigma (Burns)	.12	.32	.09	.49
Baseline IAT score	Cancer fear (Burns)	.15	.23	-.11	.41
Baseline IAT score	Cancer hopelessness (Burns)	-.09	.48	.11	.39

* indicates weak or borderline associations.

** indicates significant associations at p < .05

8.3.4. Discussion

Four hypotheses were tested in the analyses reported here, relating to relationships between implicit cancer associations and explicit measures of behavioural, knowledge, affective and attitudinal responses.

There were some indications of relationships between implicit measures of cancer associations and behavioural intentions; these appeared to depend on the extent to which the individual intention item related to the given information. These items concerned HPV vaccination intentions and intentions to speak to a potential partner about HPV; notably, no significant associations relating to HPV test intentions were shown, although previous studies in this series showed that intentions on this item are resistant to change by the information provided in these studies (as the widespread benefits of the test are not emphasised in the materials). These findings should be interpreted with caution and considered preliminary, especially given that these analyses were limited to those participants given HPV/cervical cancer information in a single study, and effects were only shown on two out of three items relating specifically to HPV. They do suggest, however, that changes in health behaviour intentions can go hand-in-hand with changes in automatic and/or perceptual processing, and this is in line with two large meta-analyses of IAT data and behaviour (Hofman et al., 2006, and Greenwald et al., 2009).

These suggestions receive partial support from the findings relating to knowledge uptake. In the university-age sample study, scores on the knowledge recognitions showed a moderate positive association with implicit cancer measures. In the controlled-materials study, a similar relationship was observed with respect to the number of content items recalled. In the latter study however no effects were observed on the recognition measure, and neither measure showed associations in the final study. Again no previous evidence was shown on this issue, although one set of findings from Chapter 4 (in the study of response in adolescents) was relevant: there was no evidence that knowledge of HPV mediated anxiety (see p123). Implicit associations may be more susceptible to change when new knowledge is absorbed than explicit anxiety levels, although it is unfortunate that no definitive conclusions can be drawn here. It is

tempting to assign importance to the significant associations here, particularly in combination with those observed relating to behavioural intentions, as this provides a possible mechanism by which basic perceptual processing determines knowledge uptake and also behavioural intentions. Further research is absolutely necessary however, which should adhere to the standard of assessing changes in knowledge over time rather than single-time point measures.

Of the variables examined here, potential associations between self report measures of affect and implicit outcomes are perhaps those which have the most face validity, because both could be argued to be relatively objective classes of measure: the IAT, as has been discussed, is designed to be a measure of automatic associations, and self-report of affect is generally assumed to be a spontaneous evaluation of the individual's own affective state. Previous research had shown weak or mixed evidence relating to associations between implicit and explicit measures of dispositions such as anxiety (Egloff and Schmukle, 2002; Egloff, Weck and Schmukle, 2007; Nosek et al., 2002). Considering that the current task was assessing a measure of implicit cancer associations rather than implicit anxiety, these findings are in line with previous studies, and suggest that changes in implicit associations are separable from simple changes in affect over time; rather than artefacts of changes in general mood, implicit associations appear to relate to more specific psychological phenomena on the basis of these results.

Similarly, no relationships were shown between implicit cancer associations and explicit measures of cancer attitudes across the three studies. As was noted in the introductory section to these analyses (p223), there is no prior evidence to suggest whether implicit measures and explicit measures of cancer attitudes should show an association or not, but arguments could be formulated for either possibility on the basis of the extensive body of findings reviewed in Chapter 2 (see section 2.2.2, p55, and the discussion of circumstances in which implicit associations and explicit attitudes may differ or correspond). Although this consideration can be applied to many of the analyses presented in this chapter, it is especially relevant here. On one hand, people may 'put on a brave front' with respect to their explicit attitudes but harbour automatic responses to cancer stimuli that cannot be circumvented; on the other, there may be no such complications. The current findings represent only a tentative and initial

indication that implicit associations and explicit attitudes are not associated with one another (and should in no way be confused with a significant negative association); if further research cannot show such associations in more extensive samples, then it would be worthwhile to examine why this is the case. This would provide valuable insight as to how automatic processes may influence individuals' responses and behaviour in the context of cancer communication.

Interpretation of the results presented in this chapter demonstrates that the interpretation of associations between implicit and explicit measures – or, in some cases, a lack of these associations – is not always a straightforward process. This is reflected in past research and controversy surrounding the metrics of the IAT; for example, key to the IAT's establishment as the most commonly used tool for measuring implicit processes were a number of findings showing that measures of implicit associations and explicit attitudes were associated with one another (see large-scale reviews by Hofman et al., 2005; Greenwald et al., 2009). If all implicit and explicit measures were associated, however, it would be implied that if an ideal implicit measure existed, it would have the same methodological use as an equivalent explicit measure. (And given that explicit/self-report measures are vastly simpler and faster to implement than implicit ones, implicit measures would therefore have very little use.) The key goal may be to work towards an understanding of why some implicit and explicit measures are associated and why others are not. Accordingly, health psychology researchers considering the use of implicit measures should consider their current shortcomingsand whether their research questions may be addressed through simpler measures.

8.3. General conclusion

These findings illustrate some of the challenges of using implicit measures in health psychology; firstly, the analysis of correlations between implicit and explicit outcomes demonstrates that interpreting implicit measures can be a difficult task, particularly when applied to novel subject areas, such as cancer fear in the current studies. And secondly, that the functional character of the test itself is also open to some degree of interpretation. Further basic research is required as to the character of implicit asssociations in assessing cancer fear, including studies with larger samples to examine

relationships between implicit associations and a range of more explicit beliefs, mean baseline levels of associations in the general population, and how variations in the task (for example, type of test used, categories employed, method of analysis) affect assessed implicit associations.

9. General discussion

9.1. Aims

The general aims of this work were outlined in Chapter 1 (p46) following an examination of previous psychosocial HPV studies. These had shown poor knowledge of HPV, but with evidence also showing that women's responses to receiving HPV information are often negative and sometimes complex (p35). Given the need to improve HPV knowledge in the general population and target population for vaccination and testing in order to meet general guidelines on informed consent and decision-making, what is the impact of HPV information? In order to answer this question, in light of the mixed range of methods and approaches used by previous research, the overall goal of the experimental series was to create and assess the value of a paradigm for objectively measuring the psychological and behavioural impact of HPV information using a randomised control design, which could also be applied to health information in general.

9.2. Summary of findings and contribution to literature

The aim of the literature review presented in Chapter 3 was to assess whether and/or how the overall goals of this project have been addressed in previous research, and how they should be examined in the studies to be conducted. A full systematic review (as defined by the guidelines set out by Cooper, 1983) was not presented here because the range of outcomes examined (and the methods used to examine them) was diverse, as was the number and types of interventions employed. A number of recommendations for the current research project were generated: these included a set of general variable dimensions that spanned knowledge, behaviour, evaluative responses, attitudes and emotional responses. It was also noted that objective measures of emotional responses were not – or very rarely - addressed in the existing literature.

The goal of the research presented in Chapter 4 was to examine knowledge and attitudes about HPV in a female, adolescent-aged sample. This study, as a multi-measure examination of the emotional and cognitive responses of adolescents, was novel as being conducted in the UK. It also represented the first use of the randomised control response evaluation method as developed following the conclusions of the literature review. Evaluations of the HPV material as both positive and negative were in line with earlier studies (although these had tended to show these effects in isolation rather than both in the same study; e.g. Mays et al., 2000; Olshen et al., 2005; Waller et al., 2006; Goldsmith et al., 2007). Earlier studies had shown negative anxiety responses to HPV in a screening context (e.g. McCaffery et al., 2004; McCaffery et al., 2005; Maissi et al., 2005); however no anxiety effects were shown here. This may indicate weaker responses in an information provision (rather than clinical/screening) context. Similar to Hoover et al., (2000) and Chan et al. (2009), results indicated good uptake of HPV information overall, and better knowledge of HPV in the HPV provision group as compared to the control groups. Broadly positive attitudes towards vaccination and future testing were also shown, although provision of HPV information did not appear to impact these. This was in line with the findings of Dempsey et al., 2006.

The study reported in Chapter 5 adapted the methods developed for the previous in-schools research for use with women of university-going age, and for individual testing sessions permitting the inclusion of repeated measures and a computer-based test of implicit associations. The design therefore permitted two measurement instances over time (baseline and post-information), and three levels of the independent variable (environmental, breast cancer and HPV/cervical cancer information). The results obtained were largely compatible with those in the previous chapter, with few effects demonstrated in terms of explicit emotional responses (again contrasting with studies in a clinical context; McCaffery et al., 2004; McCaffery et al., 2005; Maissi et al., 2005), and mixed evaluations of the HPV information source. Behavioural intentions towards preventative measures were, broadly positive, and showed modest boosts following presentation of HPV specific information, in line with the previous study and Chan et al. (2009). A single-category implicit association test was also used to examine implicit evaluations of the category ‘cancer’ before and after the presentation of information, and showed improvements over time in the HPV and environmental information

groups. The breast cancer information group, however, showed no such improvement over time. It was noted that despite implicit associations generally being held as stable, at least one previous study (Foroni & Mayr, 2005) had showed changes in implicit associations over time; this was a novel finding in a health information context, however.

Chapter 6 aimed to further investigate the changes in implicit asssociations and other effects shown by the previous study using a more conservative independent variable; rather than a comparison of practical information sources on various topics, these were simple text lists of facts on three topics. The study replicated many of the findings of the previous studies in terms of affect, evaluation and knowledge uptake. However, IAT performance, in contrast with the results of the previous study, was relatively stable over time here, with cancer terms being evaluated as consistently negative throughout. This is more in line with the traditional view of the IAT, which has been shown to have good test-retest reliability even over period of days and weeks (e.g. Shmukle and Egloff, 2004; Nosek, Greenwald and Banaji, 2006).

This study also sought to make a more thorough investigation of perceived threat and efficacy responses (as informed by Witte's, 2000, Extended Parallel Process Model), as well an extended range of variables relating to cancer attitudes, content evaluation and information uptake. Both threat and efficacy appeared to show significant changes in response to the information provided, and this was in line with Smith et al. (2009) who had previously shown that presentation of a short information source about hearing loss could boost threat perceptions (of conditions causing hearing loss) and efficacy perceptions (of recommended preventative measures) over time. In the current findings perceptions of environmental threats were strongest of all, and in terms of efficacy, the lowest rating was given to the preventative recommendations in the breast cancer information, with higher ratings given to those recomnedations in the environmental and HPV sources. A semantic-differential instrument (Snider & Osgood, 1969; Himmelfarb, 1993) was employed in this study to examine explicit content evaluations of the presented information. Use of this instrument was novel with respect to health information evaluation; no previous studies were identified using a semantic-differential instrument to this purpose. The instrument revealed differences between HPV and breast cancer information on fear evaluation items as did the more

conventional items employed in the earlier studies; HPV information was also shown to be described as more reassuring than non-health information.

The aims of the study reported in Chapter 7 were to address the outstanding questions about changes in implicit association over time, and to employ an optimised set of measures that can be recommended for future researchers wishing to examine responses to information. To address the question over implicit associations, it was hypothesised that the changes in associations shown in Chapter 5 (those results shown on p144) were linked to the format in which the information was presented. The content from Chapter 6 was therefore retained, although presented in a leaflet format more akin to that of the information used in Chapter 5. Changes in implicit associations were examined, as were cancer attitudes and risk/efficacy assessments in the post-information phase. A comprehensive repeated-measures assessment of behavioural intentions was included, as were measures relating to trait emotionality and rationality. IAT results, as shown on p198, demonstrated non-significant changes over time, though these were in line with those patterns shown in the preceding chapters. They were however sufficiently different from those in the controlled-materials study to suggest that implicit associations may be more sensitive to style and form rather than content alone. With only one former study having shown changes in implicit associations in response to a single short print source (Foroni and Mayr, 2005) it was suggested that further research was needed before any firm conclusions could be drawn. The repeat-measures use of behavioural measures (see p200) showed that intentions could change over time even without the presentation of relevant information; only the HPV vaccination intention changed in direct response to the presentation of HPV-specific information, and this was broadly in line with the results obtained in Chapters 4 (p122) and 5 (p149) and previous research by Chan et al. (2009)

The threat and efficacy variables replicated the effects of Chapter 6's controlled materials study (and those of Smith et al, 2009), and again showed that it was the environmental information which appeared to elicit the strongest threat responses using this instrument. This finding, replicating the results of the previous study in this series, has possible implications for the use and utility of the Risk Behaviour Diagnosis Scale (and possibly the EPPM in general) in health promotion research. A fuller

consideration of the implications of these results in light of previous evidence is given in section 9.5.1 (see p242).

Chapter 8 reported a number of analyses examining or comparing outcomes across each of the studies. Two cross-study analyses were highlighted as of interest: correlates of SC-IAT performance, and SC-IAT outcomes in relation to the specificity of category labels. A conflict in two pieces of previous evidence had led to the category analyses: Greenwald et al. (2003) had proposed that the particular evaluative category label used in an IAT was not important to performance in the test; Mitchell et al. (2003) suggest that modifying any such component of the test should have an effect, because of the test's sensitivity to changes in its design. Using alternative category labels appeared to produce different results if the constituent variables of the *d*-score based variable were considered; but not for the *d*-score variable itself. This result was reassuring in terms of the analyses reported in this thesis, and provided a possible resolution of the conflict shown between Greenwald et al. (2003) and Mitchell et al. (2003). In terms of correlational analyses, relevant meta-analyses had been reviewed earlier (see section 2.2.2, p55, and 2.2.3, p60), including Hofmann et al. (2005b) and Greenwald et al. (2009a), both of which had shown good predicative validity for implicit measures in terms of behaviour. Possible relationships between implicit and other measures in previous evidence were also discussed, including affective measures (Nosek et al, 2002; Egloff and Schmukle, 2002) and explicit attitudes (Richetin et al., 2007; Maison et al., 2001, Friese et al., 2008). Relationships between knowledge and implicit measures were also examined, though these effects had not been examined in any previous studies. A number of associations were shown in the correlation analyses, and while coherent patterns were observed relating to behavioural and knowledge measures (with the behavioural patterns in line with previous evidence), no effects were shown in terms of attitudinal or affective measures. That no attitudinal associations were shown is especially relevant, given that former research has shown good correspondence between implicit and explicit measures; though not necessarily of health attitudes and responses.

9.3. Limitations

Limitations specific to the individual studies have been presented in the appropriate chapter discussions; there are however a number of limitations which apply to the experimental series as a whole. These relate to the samples employed, the information sources used, the overall scope of the research and possible cohort effects.

9.3.1 Sample selection

The majority of the participants studied were of relatively high socio-economic status throughout, and as a result the findings shown may be less generalisable than would be the case if a more representative sample were used. The reason that individual socioeconomic factors were not assessed in detail or stratified was that high status was inherent to the studied participant base: students assessed in Chapter 5 attended relatively affluent schools in West London, and the remaining studies used a pool of participants drawn from a Central-London university student panel. It is difficult to estimate how these results would have differed using a more stratified sample; for example, it may be that preferences for rational and experiential information as individual differences would show greater diversity across a stratified sample, and that this may also be true for a range of other variables. It is possible that responses to health information materials may be a possible factor underpinning demographic inequalities in health, and it may be useful in future research to compare how individuals drawn from across a stratified sample of backgrounds respond to information about their own health.

9.3.2. Information sources

The work reported in Chapters 5 and 6 can be criticised in terms of the information materials used to operationalise the independent variable. That very little pretesting of the materials was carried out was a conscious decision; the materials were intended to represent three of the types of information sources that individuals may encounter in everyday life. While the core principle of the independent variable was to vary the

given topic, it was unclear as to how the materials actually varied on any concrete dimensions; it could be argued that pre-testing could have been carried out in an attempt to understand how the materials differed. An argument against this is that the studies themselves were in fact designed to develop the testing mechanism in and of itself; by this token pretesting could be seen as unnecessary, with the choice of information materials only being of limited importance, and the key goal being to develop how those materials are evaluated. The rationale behind using an extensive set of measures in the main studies was, in itself, to understand how the materials differed. With these arguments said, however, there were instances – in particular the university-age study in Chapter 6 and the hybrid materials study in Chapter 8 – where information source design could have been better sourced and pre-tested (for example in the content of the images used), and this would have allowed a more confident interpretation of those studies' findings.

Furthermore, the tendency of the environmental information sources throughout to be associated with stronger threat and efficacy perceptions means that this source perhaps should have been better evaluated; it had been assumed at the outset of these studies that this information would be more neutral and less threatening than health information. In order to assess whether any particular media focus on climate change and the environment may have been responsible for these findings, Google Trend analytics were examined around the study period for the terms 'climate' and 'environment,' reflecting the volume of searches carried out for these words in the UK; for the main study period, search volumes were average, though levels had been slightly higher than average for two years before commencement of the study period. News reference volume was low during this entire period. It seems more likely then that the current findings were related to on-going perceptions about the environment and climate rather than particular events, and future research may examine whether this pattern of results (regarding threat and efficacy perceptions) is limited to young women, as in the current sample; it may be that climate and the environment represents a more relevant threat to young women than cancer, which may be a more distant threat. Future work would benefit from the inclusion of a more neutral control source.

9.3.3. Scope of the research

A further limitation of this work was a direct result of the project's goal of using an extended range of methods and measures to capture psychological responses. Having so many variables for analysis immediately presents three problems with respect to their interpretation. First is that a comprehensive analysis of relationships and effects is, at best, challenging, and at worst, impractical; despite the time spent on them, many results of the studies reported here could have been examined in greater depth in many areas. Although this richness of data could, in general, be considered a positive aspect of the work, this represents yet another facet of evaluative work that needs specification and standardisation.

A second, and related, problem is that a number of the novel measures used were not adequately pretested. The response-focussed aim of this work meant that many standardised and/or better-researched scales and instruments were not suited to purpose, and so a number had to be developed or adapted specifically for this work (including the measure of deliberate memory used in the controlled-materials study and the emotional-rational items used in the hybrid-materials study). This unfortunately meant that some the validity or reliability of some measures could not be fully established (particularly those not drawn from previous research). Without more work, it is difficult to estimate how well these measures operationalise the intended classes of response, and the results generated by these instruments should be interpreted with caution.

A final difficulty relating to the large number of variables used is in the unfortunate tendency for significant results to hold more weight than non-significant ones in terms of how they are reported, and the increased likelihood of reporting type I errors. This is most apparent in the cross-sample analysis study, where there is a focus on those relationships between implicit and explicit variables which are significant, and may also reflect the difficulty discussed in the review chapter (that non-significant results are less regularly reported). It is hoped that the number of non-significant associations was made clear in the reporting of these analyses; for example, those instances where relationships were observed on one variable but not on a similar one were highlighted, as were those where the same relationships were not observed across studies. The

intention is for these analyses to be signposts for future research because they are largely post-hoc interpretations.

9.3.4. Cohort effects

It may also be that a cohort effect has occurred over the course of this series. This possibility can be considered informally by examining the knowledge score measure used across the three studies carried out with older women in those groups given breast cancer or environmental information: for the naturalistic materials study, 5.2 and 5.6; for the controlled materials study, 6.9 and 6.0; for the hybrid materials study, 7.15 and 7.45. These differences are more pronounced between the first and second studies however, and it is more likely however that this was due to participants being recruited on the basis of not having heard of HPV in the first study only. This criterion was abandoned in the subsequent studies, and the differences between the second and third studies was much smaller.

9.4. Implications and future research directions

9.4.1. Implications for research

The three studies in this series employing an implicit measure did not suggest that presentation of HPV information would increase negative implicit cancer associations. However, implicit associations did not appear to be entirely resistant to change over time, suggesting that associations are not impervious to short term change (in line with a small body of earlier evidence discussed on p213; most notably Foroni and Mayr, 2005). Future research on the use of implicit measures in a health information context may benefit from investigation of a number of basic issues and questions on the sensitivity of implicit measures to threatening health information. Two possible initial research questions are suggested: firstly, what is the effect of persuasive imagery on relevant implicit associations when manipulated as an independent variable? And secondly, if a treatment is formulated which brings about strong shifts in implicit

associations, would these be linked to relevant explicit attitude and/or behaviour change? Garwronski and Bodenhausen's (2006) Associative Propositional Model of attitude change specifies that implicit association change is one route by which attitude change may occur, and while the final data chapter of this thesis explored relationships between implicit association and explicit attitude change (along with behaviour change), few relationships were shown. These two research goals could therefore be combined: it seems reasonable to hypothesise that it would take imagery of a certain level of strength to impact upon implicit associations. If that level of strength could be ascertained however, what would the implications be on other variables such as explicit attitudes, behavioural intentions and risk perceptions?

Finally, the utility of implicit measures in health research will rely upon their ability to generate useful findings that other (possibly simpler) measures cannot. Whether this is the case will be determined by and depend upon interpretation of an evidence base in the health literature; the number of health-related studies using implicit measures is low at the moment (as reviewed on p60). As the number of studies using implicit measures in health research grows however, it may become possible to identify reliable effects relating to specific health behaviours (like for example the negative effects towards smoking-related stimuli shown by both smokers and non-smokers by Huiding et al., 2005), and a consensus over which implicit methodologies and configurations are most suited to health research. While this study used Karpinski and Steinman's (2006) SC-IAT, many others are available, including the standard IAT (Greenwald et al., 1998), the Extrinsic Affective Simon Task (de Houwer, 2003) and the Go/No-go Association task (Nosek & Banaji, 2001); and each of these can be configured and designed differently (as demonstrated by the analysis of category labels shown in this thesis; p218).

9.4.2. Implications for theory

The Risk Behaviour Diagnosis Scale (RBDS), as derived from the EPPM, is usually intended to show an individual's likelihood of entering into a fear or danger control state, rather than outcomes from independent groups (as in the material reviewed in section 2.3.2, p76; although see Smith et al., 2007, for an example of the use of the

EPPM as an outcome). The scale's threat, efficacy and critical value outcomes are useful, however, in comparing group-level responses in relation to a randomised independent variable, especially when considering the balance between threat and efficacy content that is communicated by an information source where some surprising results are shown. It appears, however, that the individual components of threat and efficacy are more useful in this context than the critical value; the HPV information condition's null critical value seems incongruent with the robustly positive motivation/intention effects towards vaccination that have been shown throughout this experimental series. Indeed this is in line with the approach taken in a number of the previous studies reviewed in Chapter 2 (p76); in most cases, primary reported analyses are of threat and efficacy regarded as separate variables, rather than danger versus fear control states.

The findings relating to the constituent variables of the EPPM in the present experimental series were unexpected for a number of reasons. As was noted from previous qualitative research HPV information (along with cancer information in general) is often marked out for its potential to cause anxiety and negative affect. The first two studies in this thesis also showed that it had more potential to engage participants, and was generally rated as more interesting than environmental information. This was assessed via simple, single-item questions in those studies, and given that the same information materials were also rated as more scary and reassuring using similar questions, one possibility was that threat and efficacy perceptions were driving overall engagement with the information. If this was the case, engagement should have been associated with higher threat and efficacy ratings. The data presented in Chapters 6 and 7 did not fit this pattern however; in these studies, explicit perceptions of threat and efficacy content were, in general, higher with regard to the environmental source than those information sources relating to cancer, and therefore it is the environmental information which should engage participants the most. It does not seem that explicit perceptions of threat and efficacy provide a thorough explanation of the sense of engagement with the information that was shown in the first two studies of this experimental series. One problem with using the RBDS and EPPM with HPV is the complexity of the relationship between HPV and cervical cancer. Future research into threat and efficacy perceptions and HPV may benefit from qualitative work to develop a more specific version of the RBDS that considers threat of HPV; threat of

cervical cancer; efficacy of an HPV vaccine in preventing HPV; and efficacy of an HPV vaccine in preventing cervical cancer. An instrument that considers this wider range of risk and threat perceptions may prove more sensitive than a single RBDS targeted at HPV.

9.4.3. Implications for policy and practice

In Chapter 1, the tensions between achieving informed consent and maximising uptake of HPV vaccination from a population health perspective were discussed. This issue relates to a wider argument involving the increasing importance of patient choice in health care (which can be characterised as a rise of individualism in an area where it may prove dangerous and a barrier to public health; Oliver & Evans, 2005). Parker (2001), building on Hope's (1997) report for The King's Fund, argues that patient choice can be enhanced and facilitated by integration with an evidence-based approach. The basic principle here is one of transparency; if health professionals are following guidelines that are evidence based, then the benefits of those guidelines should also be visible to health consumers. One of the labels suggested by Parker for this process of communication is *deliberative*: that is, suggesting a volitional, explicit and open process between health consumers and professionals which may also include discussions with friends and family members.

It is hoped, however, that this thesis demonstrates that deliberative processes are complex phenomena, and not merely an aspect of social interaction. *Deliberation* refers to a way in which individuals think, reflect and come to decisions; but while Parker contrasts deliberative decision-making with directed decision-making (i.e. a health decision that is 'forced' upon the patient by a health professional), it is argued here that individual decision-making can also occur using processes which do not necessarily appear particularly deliberative. As is suggested by Marteau, Dormandy and Michie (2001a) health-related decision-making may well be possible without the individual having full knowledge of the target condition or treatment.

One of the key concerns as relates to HPV information is women's knowledge as relates to their own behaviour and decision-making. Two basic questions in this

research were: firstly, can HPV information can be easily assimilated and understood, making informed consent a reasonable proposition? And secondly, will achieving informed consent harm uptake rates of the vaccine, by provision of realistic benefits and evidence? The results obtained suggest that HPV information does achieve its goal of raising knowledge, but that this process does not have a negative impact on behavioural intentions.

A related question was the role of negative affect in this decision-making process. It was speculated that recipients of HPV information may decline vaccination based on either those more considered objections arising from evidence-based information, or based on simple negative affect: would extensive information provision 'scare away' some readers on the basis of informing them of a link between sexual activity and cervical cancer? The current findings did not support this hypothesis; changes in affect, either positive or negative, were rare throughout the experimental series.

There have however been few indications that learning about the positive developments in cancer control that HPV vaccination represents have the potential to affect relevant attitudes. That this is the case has some surface validity; attitudes could be considered to be the most stable psychological construct included in the range of responses examined in this series. Attitudes may be linked to a wide range of knowledge or facts, and provision of a single fact about positive implications in cancer control may not be enough to impact wider explicit perceptions of cancer.

9.5. Concluding remarks

The general aim of this thesis, as set out on p46, was to examine the impact of HPV information on women by formulating a randomised control methodology examining responses on a range of measures. In terms of women's responses to information about HPV, the outcomes here were reassuring. HPV information in general appeared to be well-understood (even in adolescents), and while the information was often identified as having emotional content, it did not appear to be sufficient to bring about changes in affect or mood; and behavioural responses (in the form of positive intentions towards

HPV vaccination, and in some cases HPV tests and cervical screening) showed boosts in some cases.

In terms of the more methodological goal of developing a systematic approach evaluating content based on detection of psychological responses, a testing method was designed, implemented and refined over the course of five studies. The methods developed here undoubtedly require further research; not all of the issues and challenges encountered over the experimental series have been addressed, and the methods must be implemented with a range of health communication materials to assess whether the approach is generalisable. In particular, uses of implicit measures to measure responses to health information require more attention in terms of theory and methodological research. While there appears to be potential for implicit measures to provide a means of bypassing explicit strategising and accessing those fast, automatic responses that may be determinants of health-related behaviour, basic research must assess relationships and relative utility of the various types and configurations of implicit measure available, as well as their use in a range of health contexts.

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APPENDICES

Appendix 1. Information sources used in chapter four.

UCL

More about Cervical cancer and smear test screening

- In the UK there are about 2,800 cases of cervical cancer per year and 1,100 deaths.
- Cervical screening (the smear test) picks up abnormal cell changes in the cervix that can lead to cervical cancer if left untreated.
- Abnormal cell changes are easily treated if caught early.

Where is the best place to find out more?

- Cancer Research UK http://www.cancerhelp.org.uk
- Cervical Screening (NHS) http://www.cancerscreening.nhs.uk/cervical/index.html
- Or talk to your doctor.

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If you would like more information please contact:

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HPV and Cervical Cancer:

THE BASICS

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Cervical cancer and human papillomavirus (HPV)

- All cases of cervical cancer are associated with HPV (human papillomavirus) infection.
- HPV is a virus that can infect the cells of the cervix.
- The types of HPV that can cause cervical cancer do not have any symptoms.
- Other types of HPV can cause genital warts.

Hope for the future – HPV vaccines

- Vaccines that prevent HPV infection will soon be available.
- The vaccines will protect against cervical cancer.
- Some vaccines will also protect against genital warts.
- The vaccines are very effective.
- The vaccine would be most effective if given to girls before puberty.
- The government is deciding whether to make the vaccine available on the NHS.

UCL

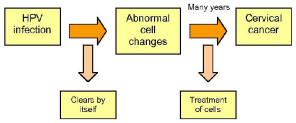
More about HPV

How common is HPV?

- About 7 out of 10 women will get HPV at some point in their lives.

How do you get HPV?

- HPV is a sexually transmitted infection (STI).
- HPV is transmitted through genital skin-to-skin contact (not necessarily sexual intercourse).
- Condoms give partial protection against HPV.
- Men can carry the HPV virus.
- In most cases, the types of HPV that cause cervical cancer do not have harmful health effects for men.
- The virus can become active after a long period of being inactive and can then cause abnormal cell changes which might eventually turn into cancer.



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What does HPV do and can it be treated?

- The immune system usually clears HPV.
- For some women, HPV will not clear by itself.
- At present there is no direct treatment for HPV itself, but the abnormal cells that the virus causes can be removed very easily to prevent cancer developing.
- If left untreated, persistent HPV probably takes 10-20 years to cause cervical cancer.

The vaccine would be given to girls to prevent HPV infection, protecting against cervical cancer.

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LONG-TERM EFFECTS

In women, if not treated, chlamydia can lead to pelvic inflammatory disease, fertility problems, ectopic pregnancy (where the baby grows outside the womb) and chronic pelvic pain.

The more times that you get chlamydia the higher your chances of not being able to have a baby (even if treated) and the more people you have sex with, the more likely you are to get it. If left untreated, there is evidence to suggest that chlamydia may affect men's fertility as well.

If you think you may have chlamydia, contact your local NHS sexual health clinic (also known as a GUM clinic) and make an appointment. It's easy and completely confidential. For more information on sexual health (including HIV), call the Sexual Health Line free (from the UK) on 0800 567 123, textphone (for people with hearing impairments) 0800 521 361 or phone your local NHS sexual health clinic.

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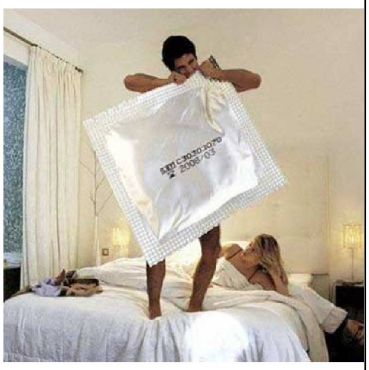

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CHLAMYDIA

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Chlamydia is a very common sexually transmitted infection (STI). There often aren't any symptoms, but if left untreated it can lead to infertility.

SIGNS AND SYMPTOMS

Most women who are infected with chlamydia will have no symptoms but some may notice:

- A change in the normal discharge from the vagina.
- More frequent or painful peeing.
- Pain during sex.
- Bleeding between periods or irregular periods.

Men are more likely to notice symptoms, but some may have none. Those with symptoms may have:

- Discharge from the penis.
- Pain or burning when urinating.

The eyes can become infected with chlamydia and if they do, both men and women may experience painful swelling and irritation.

UCL

GETTING IT

You can get chlamydia in the following ways:

- Penetrative sex (where the penis enters the vagina or anus).
- Oral sex (from mouth to the genitals or genitals to the mouth).
- Mother to baby during birth.
- Occasionally by transferring the infection on fingers from the genitals to the eyes.

UCL

DIAGNOSIS AND TREATMENT

Chlamydia tests are often taken by using a urine sample, although samples may be taken from any infected place such as the cervix for women or the urethra (urine tube) for men. These are sent to a lab for testing and the results are usually available within a week.

If the test is positive, the treatment for chlamydia is usually a simple one-off course of antibiotics. You should avoid all sexual contact for at least one week after being treated. Check with your nurse, doctor or clinic.

If you can, you should let anyone that you have had sexual contact with in the last 3 to 6 months know that they may have a sexually transmitted infection (STI) and that they need to be checked out and possibly tested. Staff at the clinic will offer you as much support as you need to do this. A woman can pass on chlamydia to her baby if she has it at the time of birth. If this happens, both baby and mother can be treated with antibiotics after birth.

UCL

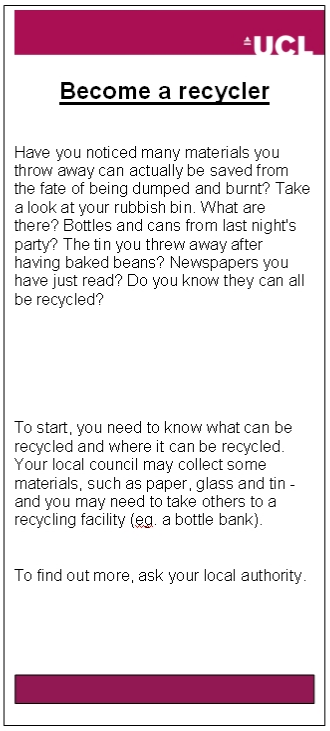
What a waste

The UK (as a whole) produces more than 434 million tonnes of waste every year. This rate of rubbish generation would fill the Albert Hall in London in less than two hours.
Every year UK households throw away the equivalent of 3½ million double-decker buses, a queue of which would stretch from London to Sydney (Australia) and back.
On average, each person in the UK throws away seven times their body weight (about 500kg) in rubbish every year.

London

London is producing enough waste to fill an Olympic size swimming pool every hour. Most of the rubbish goes to landfill sites or burnt. This not only imposes health and environmental problems, but London is also running out of spaces to bury the rubbish.

At the moment, around 20% of London's wastes are recycled. This has to be increased in order to meet UK government and EU targets. You can help by just putting in a little extra effort: Recycle!!



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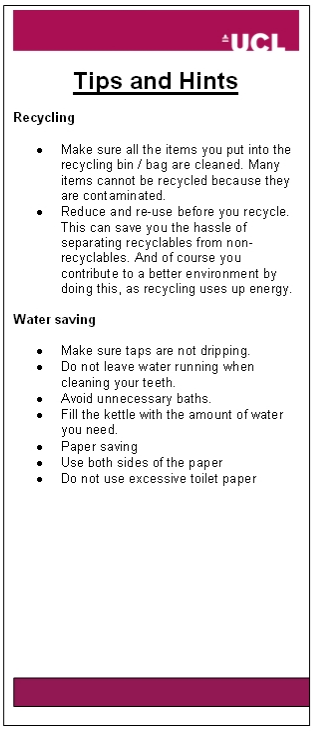
Become a recycler

Have you noticed many materials you throw away can actually be saved from the fate of being dumped and burnt? Take a look at your rubbish bin. What are there? Bottles and cans from last night's party? The tin you threw away after having baked beans? Newspapers you have just read? Do you know they can all be recycled?

To start, you need to know what can be recycled and where it can be recycled. Your local council may collect some materials, such as paper, glass and tin - and you may need to take others to a recycling facility (eg. a bottle bank).

To find out more, ask your local authority.



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Tips and Hints

Recycling

- Make sure all the items you put into the recycling bin / bag are cleaned. Many items cannot be recycled because they are contaminated.
- Reduce and re-use before you recycle. This can save you the hassle of separating recyclables from non-recyclables. And of course you contribute to a better environment by doing this, as recycling uses up energy.

Water saving

- Make sure taps are not dripping.
- Do not leave water running when cleaning your teeth.
- Avoid unnecessary baths.
- Fill the kettle with the amount of water you need.
- Paper saving
- Use both sides of the paper
- Do not use excessive toilet paper

Appendix 2. Questionnaires used in chapter four.

Questionnaire booklet

This booklet contains some questions about:

- What you thought of the leaflet you just read
- Your mood
- Your views about cancer
- Your attitudes to vaccinations

It should take about 10 minutes to complete.

When you have finished please put this booklet back into the envelope. When the entire group has finished the researcher will collect the questionnaires and explain the next part of the session.

First, some questions about the leaflet you were just asked to read before starting this booklet.

Which of the following was the topic of your leaflet:

- Recycling ☐
- Chlamydia ☐
- HPV ☐

	Not at all	Somewhat	Moderately	Very	Extremely
How interesting did you find the leaflet?	☐	☐	☐	☐	☐

Did you think the leaflet contained:

- Not enough information ☐
- About the right amount of information ☐
- Too much information ☐

Did you find any information in the leaflet scary?

Not at all scary				Very scary
1	2	3	4	5
☐	☐	☐	☐	☐

Did you find any information in the leaflet reassuring?

Not at all reassuring				Very reassuring
1	2	3	4	5
☐	☐	☐	☐	☐

Do you want to find out more on the subjects you read about in the leaflet?

Not at all				Very much so
1	2	3	4	5
☐	☐	☐	☐	☐

3

Mood

Please read each statement and then mark the appropriate boxes to indicate <u>how you feel right now</u>:

	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐

Attitudes

Please rate how much you agree with each of the following statements:

	Strongly disagree	Disagree	Agree	Strongly agree
It seems like almost everything causes cancer.	☐	☐	☐	☐
There are so many recommendations about preventing cancer that it's hard to know which ones to follow.	☐	☐	☐	☐
It is likely that I will develop cancer in my lifetime.	☐	☐	☐	☐
I am confident that I will remain free of cancer for the rest of my life.	☐	☐	☐	☐
Avoiding cancer is largely a matter of good fortune.	☐	☐	☐	☐
If I take care of myself, I can avoid cancer.	☐	☐	☐	☐
I am in control of my health.	☐	☐	☐	☐
Most things that affect my health happen to me by accident. If it's meant to be, I will stay healthy.	☐	☐	☐	☐
The main thing that affects cancer is what I myself do.	☐	☐	☐	☐
I am doubtful about new scientific advances in cancer.	☐	☐	☐	☐
There have been important scientific breakthroughs in cancer prevention.	☐	☐	☐	☐
Scientific research will eventually lead to a cure for cancer.	☐	☐	☐	☐
I feel positive about new scientific advances in cancer.	☐	☐	☐	☐
Cancer research has improved cancer detection rates.	☐	☐	☐	☐
There have been important scientific breakthroughs in cancer treatment.	☐	☐	☐	☐
One day, no-one will have to worry about getting cancer.	☐	☐	☐	☐
Medical science has cancer under control.	☐	☐	☐	☐

5

Your knowledge of HPV

Next, please answer the following questions about HPV. Don't worry if you are not sure about the answers or the terms used! Just answer to the best of your ability.

Please read each of the statements about HPV and indicate whether they are true or false by ticking (✓) the appropriate box.

	True	False	Not Sure
HPV often has no visible signs or symptoms	☐	☐	☐
A smear test will always pick up an HPV infection in the cervix (the cervix is the neck of the womb)	☐	☐	☐
Having many sexual partners increases the risk of getting HPV	☐	☐	☐
HPV usually has no effect on men	☐	☐	☐
HPV always causes genital warts	☐	☐	☐
HPV is related to the AIDS virus	☐	☐	☐
HPV can be transmitted during sexual intercourse	☐	☐	☐
HPV can be treated with antibiotics	☐	☐	☐
HPV is very rare	☐	☐	☐
HPV can cause cervical cancer (cancer of the neck of the womb)	☐	☐	☐
HPV usually goes away without needing any treatment	☐	☐	☐
Most sexually active people will get HPV at some point in their lives	☐	☐	☐
A person always knows if they have HPV	☐	☐	☐
A person could have HPV for many years without knowing it	☐	☐	☐
Men cannot get HPV	☐	☐	☐

6

Women aged 25-64 years are offered smear tests every 3-5 years. A smear test checks the health of the cervix, and allows doctors to find changes in the cervix before they can develop into cancer.

When you are older and are invited for a smear test, how likely is it that you will go?

Very unlikely	Unlikely	Likely	Very likely
☐	☐	☐	☐

Now some general questions about having vaccinations.

Your attitudes towards vaccinations	Strongly disagree	Disagree	Agree	Strongly agree
Vaccinations are effective in preventing disease	☐	☐	☐	☐
I am concerned about vaccination side effects	☐	☐	☐	☐
It is very important that I receive all my vaccinations	☐	☐	☐	☐
I am afraid of needles	☐	☐	☐	☐
It is better to get the disease and get protected from it naturally than to be vaccinated	☐	☐	☐	☐
If the disease is not serious, it is not worth getting a jab to prevent it	☐	☐	☐	☐
I don't want to have too many vaccinations	☐	☐	☐	☐

7

NOW SOME INFORMATION ABOUT HPV TO READ ……..

1. **All cases of cervical cancer are associated with HPV (human papillomavirus) infection.**
2. **HPV is a virus that can infect the cells of the cervix.**
3. **Vaccines that prevent HPV infection will soon be available**

In the future women aged 25-64 may be offered a test for HPV when they have a smear test.
If you were offered a test for HPV in the future, how likely is it that you would have one?

Very unlikely	Unlikely	Likely	Very likely
☐	☐	☐	☐

In the future girls aged 12-16 years may be offered a vaccination to prevent HPV infection.
If you were invited to have HPV vaccination, how likely would you be to have it?

Very unlikely	Unlikely	Likely	Very likely
☐	☐	☐	☐

Your attitudes towards HPV vaccination	Strongly disagree	Disagree	Agree	Strongly agree
I would want to be on the safe side and have the HPV vaccination	☐	☐	☐	☐
I would be very worried about side effects of the HPV vaccination	☐	☐	☐	☐
Having the vaccination would be a good way to protect myself against cervical cancer	☐	☐	☐	☐
Having the vaccination would be a good way to protect myself from HPV	☐	☐	☐	☐
Having the HPV vaccination might make girls more likely to have sex	☐	☐	☐	☐
Girls who had the HPV vaccination would be more likely to have unprotected sex	☐	☐	☐	☐

How important would the following things be in influencing your decision to have HPV vaccination?	Not at all important	Slightly important	Moderately important	Very important
That it is recommended by a doctor	☐	☐	☐	☐
That my parents want me to have the vaccine	☐	☐	☐	☐
That my friends have the vaccine too	☐	☐	☐	☐
That the vaccine is effective	☐	☐	☐	☐
That the vaccine is safe	☐	☐	☐	☐

8

And a few questions about you ….

How old are you? ☐☐

Which school year are you in?

Year 9	Year 10	Year 11
☐	☐	☐

Which of these best describes your ethnic background?

☐ Asian or Asian British	☐ Chinese
☐ Black or Black British (African)	☐ White British
☐ Black or Black British (Caribbean)	☐ Do not wish to answer
☐ Mixed	☐ Other……

End of questions and thank you very much

Appendix 3. Manuscript of paper using data from chapter four.

ELSEVIER

Journal of Adolescent Health ■ (2009) 1–3

JOURNAL OF ADOLESCENT HEALTH

Adolescent health brief

An Experimental Investigation of the Emotional and Motivational Impact of HPV Information in Adolescents

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Manuscript received March 27, 2009; manuscript accepted June 8, 2009

Abstract We examined psychologic responses to information about human papillomavirus (HPV) in young women aged 13 to 16 within the age range of the UK's HPV vaccination "catch-up" program. Respondents absorbed HPV information without becoming worried, were receptive to cervical screening and vaccination, and these attitudes were enhanced by presentation of relevant information.

Keywords: Vaccines; Adolescent; HPV vaccines

High-risk types of human papillomavirus (HPV) are a key etiologic factor in cervical carcinogenesis [1], and a government-funded immunization program started in the United Kingdom (UK) in September 2008. Medical ethics require that individuals consenting to vaccination should know about the reasons for and associated risks/benefits of vaccination, but HPV information is complex, and may have an emotional impact. Qualitative evidence to date suggests that provision of HPV information may provoke negative emotions, and that the link between sexual activity and cervical cancer is often perceived as shocking [2].

Many studies have evaluated HPV knowledge and information needs in adult women [3,4], but fewer have in adolescents, particularly following the recent publicity associated with the vaccine. A recent Finnish survey of 1,874 households found that 33% of adolescent respondents (62% of whom were female) had heard of HPV [5]; a UK survey of 328 adolescent women aged 16 to 19 estimated only 6% [6].

Older adolescents are likely to take an active decision-making role [7], so it is crucial to understand their reactions to learning about HPV. Signed parental consent is requested before in-school vaccination is administered before the age of 16, but individuals under 16 who can demonstrate appropriate understanding (or Gillick competence) can be vaccinated without parental consent, although this may be at the discretion of in-school medical staff. This study, carried out prior to the roll-out of the UK vaccination program, used an experimental methodology to assess emotional and motivational responses to HPV information in young women in the "catch-up" vaccination age range (13–16 years), to assess whether a tension exists between provision of health information and minimizing negative affect.

Methods

Students aged 13–16 years at two London schools were randomized to receive a leaflet about HPV, Chlamydia, or the environment, in supervised classroom settings. The Chlamydia and environment leaflets acted as controls; the former for the inclusion of sexually transmitted infection (STI)-related content and advice, and the latter for the provision of any information or advice. Students were given 5 minutes to read the information and then completed a questionnaire. Consent was obtained from the students and their parents.

The HPV material was designed following interviews assessing the information requirements of women [8] using thematic analysis based on Leventhal's Common Sense Model of lay illness representations [9]. The Chlamydia and environmental materials were collated from public information sources. The health-based leaflets covered prevalence, detection, prevention, treatment, and symptoms. The environmental leaflet attempted to cover equivalent topics,

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including prevalence and effects of pollution and recycling as preventatives against climate change. Knowledge was assessed using true-or-false statements about HPV, and anxiety using the six-item State-Trait Anxiety Inventory (STAI) [10]. Students also evaluated the information on three dimensions labeled "reassuring," "scary," and "interesting." Future intentions to participate in cervical screening, HPV testing, and HPV vaccination were assessed. Differences in outcomes were compared using between subjects analyses of variance.

Results

Summaries of mean scores and results of the main analyses are presented in Table 1. The sample comprised 174 students (with power to detect medium-to-large effects between groups) with a mean age of 14.3 years; one student declined participation on the day of testing, and one other was excluded from analysis having already received the vaccine. Seventy-nine percent of students self-identified as Caucasian British, 8% as Asian/Asian British, and 13% as "mixed"/"other" ethnicities.

Students given HPV information demonstrated significantly more HPV knowledge ($F = 31.2$; $p < .001$) than either the Chlamydia ($p < .001$) or environmental ($p < .001$) groups. Mean STAI scores did not differ by information condition ($F = .57$, $p = .59$).

Post hoc comparisons revealed that HPV information was rated as significantly more interesting ($p = .03$), scary ($p = .007$), and reassuring ($p < .001$) than the environmental information but not the Chlamydia information (respectively, $p = .55$, $p = .85$, and $p = .41$).

Students had positive intentions toward HPV testing (91% likely/very likely), vaccination (82% likely/very likely), and cervical screening (91% likely/very likely). There were significant between-group differences in intentions to attend cervical screening ($F = 3.1$, $p = .05$) and accept HPV vaccination ($F = 3.1$, $p = .05$), but not in intentions to have an HPV test ($p = .09$). HPV vaccination and testing were better accepted by the HPV than the environmental group (respectively, $p = .02$, $p = .03$), but not more so than the Chlamydia group.

Discussion

These findings are encouraging for the UK's newly introduced vaccination program, suggesting that young women are positive about vaccination and receptive to relevant information. Learning about HPV did not reduce future intentions to attend cervical screening or increase anxiety. HPV information, like Chlamydia information, was rated as more "scary" than information about the environment, but was not associated with greater anxiety, suggesting a cognitive rather than an emotional response. More differences were observed in relation to screening and vaccination intentions than to HPV testing intentions; this is understandable given that the possible benefits of HPV testing as a triage technique during screening were not emphasized in the leaflet. HPV information was also rated as more interesting and reassuring. Although the HPV information was designed for older women and not tailored for this age group it still elicited positive responses and was understood.

Students given Chlamydia information were as enthusiastic about screening and HPV testing as those given HPV information, suggesting that the sexual health theme in general promoted greater engagement with cervical screening; perhaps because STI information is of particular interest to adolescents. HPV information could fit well into a general education program on STIs, where it could "piggyback" onto existing education campaigns.

Table 1
Cognitive, attitudinal, and motivational reactions by information condition

	Information condition			
	HPV n = 56 mean (SD)	Chlamydia n = 59 mean (SD)	Environmental n = 59 mean (SD)	*F* (*p*-value)
Knowledge (scale range: 0–14)				
HPV knowledge score	10.18 (3.88)	6.13 (3.88)	5.66 (3.22)	31.18 (<.001)
Affective responses (scale range: 6–24)				
STAI (anxiety)	11.73 (3.07)	11.21 (3.33)	11.19 (3.05)	.57 (.586)
Attitudinal responses (scale range: 0–4)				
Interesting	3.09 (.8)	3.19 (.88)	2.71 (1.00)	4.38 (.014)
Scary	2.52 (.8)	2.66 (.99)	2.04 (.95)	8.45 (<.001)
Reassuring	2.96 (.98)	3.00 (.97)	2.36 (.84)	6.95 (.001)
Motivational/behavioral responses (1–4)				
Screening intention	3.44 (.66)	3.42 (.65)	3.14 (.80)	3.12 (.047)
HPV test intention	3.40 (.78)	3.41 (.59)	3.16 (.71)	2.40 (.094)
HPV vaccination intention	3.36 (.74)	3.09 (.80)	3.00 (.89)	3.10 (.048)

HPV = human papillomavirus; STAI = State-Trait Anxiety Inventory.

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Although this study has limitations, including a lack of stratification for socioeconomic status, we detected no evidence of negative emotional responses to HPV information. Further research should address possible predictors and mediators of the outcomes reported here: for example, relevant past behaviors (e.g., discussions with parent/guardian) and previous exposure to HPV information. Young women in this age group seem able to understand and assimilate detailed HPV information from an information source without showing increased levels of anxiety, and even minimal information was associated with high enthusiasm for vaccination. Obtaining informed consent in this age range therefore seems a reasonable prospect and should not adversely impact coverage.

Acknowledgments

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Appendix 4. Information sources used in chapter five.

What affects your risk?

The risk of developing breast cancer is strongly linked to **age**. The older you are, the greater your chances of getting the disease.

Women's risk of breast cancer	
by age 30	1 in 1,900
40	1 in 200
50	1 in 50
60	1 in 23
70	1 in 15
over a lifetime	1 in 9

What increases your risk?

Family history
Breast cancer is common and many women have a family history of the disease. A history of breast cancer in the family puts you at slightly increased risk, but most women with one or two affected relatives will not get breast cancer.

Your risk is greater if a close relative had breast cancer before the age of 50, or if two or more close relatives have been affected. If you have a strong family history and are worried about your risk, discuss this with your doctor. If appropriate, they will refer you to a breast care unit or genetics clinic.

Menstruation
Starting your periods at a younger age or having a late menopause increases the risk.

HRT
Hormone replacement therapy increases the risk of breast cancer. Risk increases the longer you take it, and decreases gradually after you stop taking it. If you have any worries it's best to consult your doctor.

The Pill
Taking oral contraceptives may cause a small increase in risk, but your risk gradually returns to normal after you stop taking them.

Obesity
Being overweight after the menopause increases a woman's risk of breast cancer, as body fat affects hormone levels. Try to maintain a healthy body weight. Combine a balanced, low fat diet with regular exercise.

Alcohol
Drinking alcohol increases the risk of breast cancer. The more you drink each day, the greater your risk.

What decreases your risk?

Breastfeeding
The longer a woman breastfeeds her children, the lower her risk of breast cancer.

Having children
The more children a woman has, the lower her risk of breast cancer. Being younger when you have your children also decreases your risk.

Screening

In the UK women aged between 50 and 64 are offered screening for breast cancer every three years. The programme is gradually being extended to include women up to 70 years old. Screening involves taking x-rays of the breasts (mammography).

Breast screening can show cancers at an early stage, when they are too small for you to notice. When changes are found early, there is an excellent chance of successful treatment.

It is important to attend screening whenever you are invited.

If you are 65 or over, speak to your doctor who can arrange a screening appointment for you.

Breast screening is effective, but it is not perfect. Don't forget to **keep a check on your breasts**, even if you have been for screening.

Early detection saves lives

Be 'breast aware' and follow the five point code…

- know what is normal **for you**
- **look at** and **feel** your breasts
- know what **changes** to look for
- report any changes **without delay**
- go for **breast screening** if you are 50 or over

Your breasts may feel different depending on the time of the month and your stage of life. When you know how they normally look and feel, you will be able to spot any unusual changes. Check yourself in a way that's comfortable for you, perhaps in the bath or shower.

What changes should I look for?

It is often women themselves who first notice their breast cancer. Most changes are not caused by cancer, but it is very important to report anything unusual to your doctor. Look for…

- changes in the size, shape or feel of your breasts
- a new lump or thickening in one breast or armpit
- any puckering, dimpling or redness of the skin
- changes in the position of the nipple, a rash or nipple discharge
- pain or discomfort that is new to you and felt only on one side

Breast screening for the over 50s and breast awareness for all women, offer the best chance of finding breast cancer early.

Further information

For more about cancer visit our patient information website **www.cancerhelp.org.uk** click on 'specific cancers' then 'breast cancer'.

If you want to talk in confidence about cancer, call our **information nurses**. Direct line **020 7061 8355** or freephone 0800 CANCER / 0800 226 237 or email **cancer.info@cancer.org.uk**

Order copies of this and other cancer awareness leaflets online at **www.cancerresearchuk.org/leaflets** or call **020 7061 8333**.

About Cancer Research UK

Cancer Research UK is the leading charity dedicated to research on the causes, treatment and prevention of cancer. If you would like to support our work please call **020 7009 8820** or visit our website.

Cancer Research UK
PO Box 123
London WC2A 3PX
020 7242 0200

www.cancerresearchuk.org
www.cancerhelp.org.uk

September 2004
Registered charity no. 1089464

CANCER RESEARCH UK

Appendix 5. Questionnaires used in chapter five.

SMART Materials – Booklet I

Thank you for attending this session. This booklet contains a series of questions about:

- **You and your background**
- **Your experiences with cancer and cancer screening**
- **Your mood**

Your answers will be treated with the strictest confidence and will be used to develop health information. If you are unsure about any questions or issues, please feel free to ask the experimenter at any time. There will also be an opportunity to ask questions at the end of this session.

Once you have finished filling in the booklet, please let the experimenter know.

About You

Please answer the following questions about yourself.

What is your age?	☐☐
Are you:	Male ☐ Female ☐
Is English your first language?	Yes ☐ No ☐

What is your religion?

☐ None	☐ Hindu
☐ Christian – Catholic	☐ Jewish
☐ Christian – Church of England	☐ Muslim
☐ Christian – other	☐ Sikh
☐ Buddhist	Any other religion

Would you describe yourself as practicing this religion? Yes ☐ No ☐ n/a ☐

Which of these best describes your ethnic background?

☐ Asian or Asian British	☐ Chinese
☐ Black or Black British (African)	☐ White British
☐ Black or Black British (Caribbean)	☐ Do not wish to answer
☐ Mixed	☐ Other……

Your experiences with cancer

Now we would like to ask you some questions relating to your own experiences with cancer and cancer screening.

Have you, your family or close friends had cancer? (please tick all that apply)

☐ You	☐ Close Friend
☐ Partner	☐ Other Friend
☐ Close family member	☐ Not sure
☐ Other family member	☐ Do not wish to answer

	Much below average	Below average	Average for women my age	Above average	Much above average
Compared to other women your age, what do you think that your chances of getting *cervical* cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *breast* cancer are?	☐	☐	☐	☐	☐

Have you ever had a smear test?

Yes ☐ No ☐ Would prefer not to answer ☐

If Yes: **Approximately what was the date of your last test? (MM YYYY)** ☐☐ ☐☐☐☐

If No: if you were offered a smear test in the next 3 months, how likely is it that you would have the test?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Have you ever been recommended to carry out breast self-examination?

Yes ☐ No ☐ Would prefer not to answer ☐

Thinking about breast self examination, which ONE of the following statements is closest to your situation?

I do regular breast self examinations and do not need reminding.	☐
I do regular breast self examinations but do need reminding.	☐
I do not do breast self examinations in spite of reminders to do so.	☐
I have never done a breast self examination.	☐

Have you ever heard of HPV?

Yes ☐ No ☐

If YES, please answer the rest of the questions on this page.

If NO, please continue on the next page.

Please use the following space to briefly outline what you know about HPV.

If you were offered a test for HPV in the next 3 months, how likely is it that you would have the test?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If you were invited to have an HPV vaccination in the next 3 months, how likely would you be to have the vaccination?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Mood

This list of words describes different feelings and emotions. Read each item and then mark the appropriate box to Indicate the extent you feel this way right now.

	very slightly or not at all	a little	moderately	quite a bit	extremely
Interested	☐	☐	☐	☐	☐
Irritable	☐	☐	☐	☐	☐
Distressed	☐	☐	☐	☐	☐
Alert	☐	☐	☐	☐	☐
Excited	☐	☐	☐	☐	☐
Ashamed	☐	☐	☐	☐	☐
Upset	☐	☐	☐	☐	☐
Inspired	☐	☐	☐	☐	☐
Strong	☐	☐	☐	☐	☐
Nervous	☐	☐	☐	☐	☐
Guilty	☐	☐	☐	☐	☐
Determined	☐	☐	☐	☐	☐
Scared	☐	☐	☐	☐	☐
Attentive	☐	☐	☐	☐	☐
Hostile	☐	☐	☐	☐	☐
Jittery (on edge)	☐	☐	☐	☐	☐
Enthusiastic	☐	☐	☐	☐	☐
Active	☐	☐	☐	☐	☐
Proud	☐	☐	☐	☐	☐
Afraid	☐	☐	☐	☐	☐

Please read each statement, and then mark the appropriate boxes to indicate how you feel right now				
	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐

End of questions.

Please inform the experimenter.

SMART Materials – Booklet II

This booklet contains a second series of questions about:

- **Your knowledge and attitudes about issues in cancer research.**
- **Your mood.**

Some questions are very similar to those in the first booklet; this is intentional and we apologise if it's boring.

Again, once you have finished filling in this booklet, please let the experimenter know.

Your knowledge of HPV

Please answer the following questions about HPV. Do not worry if you are not sure about the answers or the terms used; simply answer to the best of your knowledge.

Please read each of the statements about HPV and indicate whether they are true or false by ticking (✓) the appropriate box.			
	True	False	Don't know
HPV often has no visible signs or symptoms	☐	☐	☐
A smear test will always pick up an HPV infection in the cervix	☐	☐	☐
Having many sexual partners increases the risk of getting HPV	☐	☐	☐
HPV usually has no effect on men	☐	☐	☐
HPV always causes genital warts	☐	☐	☐
HPV is related to the AIDS virus	☐	☐	☐
HPV can be transmitted during sexual intercourse	☐	☐	☐
HPV can be treated with antibiotics	☐	☐	☐
HPV is very rare	☐	☐	☐
HPV can cause cervical cancer	☐	☐	☐
HPV usually goes away without needing any treatment	☐	☐	☐
Most sexually active people will get HPV at some point in their lives	☐	☐	☐
A person always knows if they have HPV	☐	☐	☐
A person could have HPV for many years without knowing it	☐	☐	☐
Men cannot get HPV	☐	☐	☐

If you were offered a smear test in the next 3 months, how likely is it that you would have the test?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a test for HPV in the next 3 months, how likely is it that you would have the test?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If you were invited to have HPV vaccination in the next 3 months, how likely would you be to have the vaccination?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Mood

This list of words describes different feelings and emotions. Read each item and then mark the appropriate answer in the box next to the word. Indicate the extent you feel this way right now.	very slightly or not at all	a little	moderately	quite a bit	extremely
Interested	☐	☐	☐	☐	☐
Irritable	☐	☐	☐	☐	☐
Distressed	☐	☐	☐	☐	☐
Alert	☐	☐	☐	☐	☐
Excited	☐	☐	☐	☐	☐
Ashamed	☐	☐	☐	☐	☐
Upset	☐	☐	☐	☐	☐
Inspired	☐	☐	☐	☐	☐
Strong	☐	☐	☐	☐	☐
Nervous	☐	☐	☐	☐	☐
Guilty	☐	☐	☐	☐	☐
Determined	☐	☐	☐	☐	☐
Scared	☐	☐	☐	☐	☐
Attentive	☐	☐	☐	☐	☐
Hostile	☐	☐	☐	☐	☐
Jittery (on edge)	☐	☐	☐	☐	☐
Enthusiastic	☐	☐	☐	☐	☐
Active	☐	☐	☐	☐	☐
Proud	☐	☐	☐	☐	☐
Afraid	☐	☐	☐	☐	☐

Please read each statement, and then mark the appropriate boxes to indicate <u>how you feel right now</u>, at this moment				
	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐

Your attitudes towards health, cancer and scientific progress

Please read the following statements, and mark the appropriate box to indicate how strongly you agree or disagree with each.

	Strongly Disagree	Disagree	Agree	Strongly Agree
In uncertain times, I usually expect the best.	☐	☐	☐	☐
It's easy for me to relax.	☐	☐	☐	☐
If something can go wrong for me, it will.	☐	☐	☐	☐
I'm always optimistic about my future.	☐	☐	☐	☐
I enjoy my friends a lot.	☐	☐	☐	☐
It's important for me to keep busy.	☐	☐	☐	☐
I hardly ever expect things to go my way.	☐	☐	☐	☐
I don't get upset too easily.	☐	☐	☐	☐
I cannot count on good things happening to me.	☐	☐	☐	☐
Overall, I expect more good things to happen to me than bad.	☐	☐	☐	☐
It seems like almost everything causes cancer.	☐	☐	☐	☐
There's not much I can do to reduce my chances of getting cancer.	☐	☐	☐	☐
There are so many recommendations about preventing cancer that it's hard to know which ones to follow.	☐	☐	☐	☐
If I have cancer, it can't be cured anyway, so why bother to check.	☐	☐	☐	☐
I can control whether or not I develop cancer at some time during my life.	☐	☐	☐	☐
It is likely that I will develop cancer in my lifetime.	☐	☐	☐	☐
I am confident that I will remain free of cancer for the rest of my life.	☐	☐	☐	☐
If I get cancer, it is my own behaviour which determines how quickly I get well again.	☐	☐	☐	☐
No matter what I do, if I am going to get cancer, I will get cancer.	☐	☐	☐	☐
Having regular contact with my physician is the best way for me to avoid cancer.	☐	☐	☐	☐
Avoiding cancer is largely a matter of good fortune.	☐	☐	☐	☐
If I take care of myself, I can avoid cancer.	☐	☐	☐	☐
I am in control of my health.	☐	☐	☐	☐
Most things that affect my health happen to me by accident. If it's meant to be, I will stay healthy.	☐	☐	☐	☐
The main thing that affects cancer is what I myself do.	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
One day, there will be a time when nobody dies of cancer.	☐	☐	☐	☐
More people die of cancer today than did twenty years ago.	☐	☐	☐	☐
I am doubtful about new scientific advances in cancer.	☐	☐	☐	☐
There have been important scientific breakthroughs in cancer prevention.	☐	☐	☐	☐
Scientific research will eventually lead to a cure for cancer.	☐	☐	☐	☐
I feel positive about new scientific advances in cancer.	☐	☐	☐	☐
Most of the stories I read about cancer are negative.	☐	☐	☐	☐
Medical science has failed to defeat cancer.	☐	☐	☐	☐
Cancer research has improved cancer detection rates.	☐	☐	☐	☐
There have been important scientific breakthroughs in cancer treatment.	☐	☐	☐	☐
More money should be spent on cancer research than is currently being spent.	☐	☐	☐	☐

Please read the following:
Sally is a 44 year-old single woman who has recently been diagnosed with cervical cancer. She works as a legal secretary in a large law firm and has a good social life.
Sally's colleagues have just found out she has cervical cancer. Please rate how much you agree with each of the following statements.
Sally's colleagues would pity her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would avoid her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would think badly of her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would blame her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would think she was unclean
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would not want to be friends with her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's male colleagues would not want to have a sexual relationship with her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would be uncomfortable around her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐
Sally's colleagues would be angry with her
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly agree ☐

End of questions.

Please put this booklet in the envelope & inform the experimenter.

Appendix 6. Information sources used in chapter six.

Cervical cancer and human papillomavirus (HPV): The Basics

- In the UK there are about 2,800 cases of cervical cancer (cancer of the neck of the womb) per year and 1,100 deaths.
- 100% of cases of cervical cancer are associated with HPV (human papillomavirus) infection.
- HPV is a sexually transmitted infection (STI).
- About 8 out of 10 women will get HPV at some point in their lives.
- Most HPV infections are cleared by the immune system.
- The types of HPV that can cause cervical cancer do not have any symptoms.
- Men can carry the HPV virus, but in most cases, the types of HPV that cause cervical cancer do not have harmful health effects for men.
- At present there is no direct treatment for HPV itself, but the abnormal cells that the virus causes can be removed very easily to prevent cancer developing.
- These cell changes in the cervix are detected by cervical screening.
- In cases where HPV is not cleared by the immune system, HPV probably takes 10-20 years to cause cervical cancer.
- Vaccines that prevent HPV infection will soon be given to adolescent girls on the NHS, although these are not suitable for older women.
- The vaccines will protect against cervical cancer and are very effective.

Recycling: The Basics

- The UK (as a whole) produces more than 434 million tonnes of waste per annum.
- On average, each person in the UK throws away about 500kg in refuse every year.
- The UK is relatively poor at recycling when compared to some of our neighbouring EU countries, some recycling over 50% of their waste.
- When rubbish buried in landfills decomposes, it produces carbon dioxide and methane which are both greenhouse gases contributing to climate change.
- As materials break down they produce a toxic liquid called leachate, which can pollute rivers and ground water supplies if not managed properly.
- Up to 60% of the rubbish that ends up in the dustbin could be recycled.
- 9 out of 10 people would recycle more if the process were made easier.
- Non-biodegradable plastics can take up to 500 years to decompose.
- The use of plastic in Western Europe is growing by about 4% each year.
- Eight out of 10 polyethylene terephthalate (PET) water bottles become landfill waste.
- Local councils may collect some materials, such as paper, glass and tin, but others may need to be taken to a recycling facility (eg. a bottle bank).
- Items placed into recycling bins or bags should be cleaned as contaminated items cannot be recycled.

Breast Cancer: The Basics

- In the UK there are about 44,000 diagnoses of breast cancer per annum and it causes around 12,500 deaths.
- 79 out of every 100 people diagnosed with breast cancer live for at least 5 years after diagnosis.
- Breast cancer develops when a single cell in the breast begins to multiply out of control and forms a tumour.
- Cells may break away and relocate to other parts of the body via the bloodstream, starting new tumours.
- Breast cancer is now the most commonly diagnosed cancer in the UK.
- 9 out of 10 breast lumps are benign, meaning that they will not develop into cancers.
- Breast cancer is rare in women under 30 and occurs more frequently in post menopausal women.
- Men can get breast cancer but this is a rare occurrence.
- The first symptom of breast cancer for many women is a lump in their breast.
- Women aged 50 and over will be invited for a mammogram at a specialised clinic or screening unit every three years.
- Breast screening is a technique for detecting breast cancer at an initial stage. Most women find it a bit uncomfortable and a few find it painful.
- Breast cancer can be treated with a combination of surgery, radiotherapy and/or chemotherapy and hormone therapy.

Appendix 7. Questionnaires used in Chapter six.

Booklet I

Thank you for attending this session. This booklet contains a series of questions about:

- **You and your background**
- **Your experiences with cancer**

Your answers will be treated with the strictest confidence and will be used to develop health information. If you are unsure about any questions or issues, please feel free to ask the experimenter at any time. There will also be an opportunity to ask questions at the end of this session.

Once you have finished filling in the booklet, please let the experimenter know.

About You

Please answer the following questions about yourself.

What is your age?	☐☐
Are you:	Male ☐ Female ☐
Is English your first language?	Yes ☐ No ☐

What is your religion?

☐ None	☐ Hindu
☐ Christian – Catholic	☐ Jewish
☐ Christian – Church of England	☐ Muslim
☐ Christian – other	☐ Sikh
☐ Buddhist	Any other religion

Would you describe yourself as practicing this religion? Yes ☐ No ☐ n/a ☐

Which of these best describes your ethnic background?

☐ Asian or Asian British	☐ Chinese
☐ Black or Black British (African)	☐ White British
☐ Black or Black British (Caribbean)	☐ Do not wish to answer
☐ Mixed	☐ Other……

Your experiences with cancer

Now we would like to ask you some questions relating to your own experiences with cancer and cancer screening.

Have you, your family or close friends had cancer? (please tick all that apply)

- ☐ You
- ☐ Partner
- ☐ Close family member
- ☐ Other family member
- ☐ Close Friend
- ☐ Other Friend
- ☐ Not sure
- ☐ Do not wish to answer

How much would you say that you know about the causes of cancer?

Very little				A lot
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How confident are you in your response to the previous question?

Very confident				Not at all confident
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How much would you say that you know about the things you can do to lower your own risk of getting cancer?

Very little				A lot
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How confident are you in your response to the previous question?

Very confident				Not at all confident
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

	Much below average	Below average	Average for women my age	Above average	Much above average
Compared to other women your age, what do you think that your chances of getting cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *cervical* cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *breast* cancer are?	☐	☐	☐	☐	☐

Have you ever heard of HPV?

Yes ☐ No ☐

If YES, Please use the following space to briefly outline what you know about HPV.

If you were offered a test for HPV in the next 3 months, how likely is it that you would have the test?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If you were invited to have an HPV vaccination in the next 3 months, how likely would you be to have the vaccination?

Very unlikely						Very likely
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

The following questions are designed to find out how you associate certain words and phrases with the thought of **cancer**. Please mark a number between each of the following pairs of words to indicate which is closer to how you think about **cancer**. Please respond quickly with your initial gut feeling; that is, with at little thought as possible.								
Painless	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Severe, constant, untreatable pain
No fear	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Terror
Body mutilation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No body changes
Pleasant odours	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Foul odours
Independency	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Dependency
No life changes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Sudden, overwhelming life changes
Extreme suffering	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No suffering
Nourished	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Wasting away
Certain future	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Uncertain future
Destructive, uncontained growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Normal growth
Punishment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No punishment
Worthlessness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Worth
Shame	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Pride
Acceptance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Rejection
Alienation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Belonging
Being wanted	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Not being wanted
Unloved	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Loved
Abandoned	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Cared for
Hopefulness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Hopelessness
Certain death	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Being cured
Helplessness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Control
Optimism	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Pessimism
Unknown	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Known

Mood

A number of statements which people have used to describe themselves are given below. Read each statement and then indicate to the right how you feel right now, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I feel secure	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel strained	☐	☐	☐	☐
I feel at ease	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am presently worrying over possible misfortunes	☐	☐	☐	☐
I feel satisfied	☐	☐	☐	☐
I feel frightened	☐	☐	☐	☐
I feel comfortable	☐	☐	☐	☐
I feel self-confident	☐	☐	☐	☐
I feel nervous	☐	☐	☐	☐
I am jittery	☐	☐	☐	☐
I feel indecisive	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐
I feel confused	☐	☐	☐	☐
I feel steady	☐	☐	☐	☐
I feel pleasant	☐	☐	☐	☐

A number of statements which people have used to describe themselves are given below. Read each statement and then indicate to the right how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.				
	Not at all	Somewhat	Moderately	Very much
I feel pleasant	☐	☐	☐	☐
I feel nervous and restless	☐	☐	☐	☐
I feel satisfied with myself	☐	☐	☐	☐
I wish I could be as happy as others seem to be	☐	☐	☐	☐
I feel like a failure	☐	☐	☐	☐
I feel rested	☐	☐	☐	☐
I am "cool, calm, and collected"	☐	☐	☐	☐
I feel that difficulties are piling up so that I cannot overcome them	☐	☐	☐	☐
I worry too much over something that doesn't really matter	☐	☐	☐	☐
I am happy	☐	☐	☐	☐
I have disturbing thoughts	☐	☐	☐	☐
I lack self-confidence	☐	☐	☐	☐
I feel secure	☐	☐	☐	☐
I make decisions easily	☐	☐	☐	☐
I feel inadequate	☐	☐	☐	☐
I am content	☐	☐	☐	☐
Some unimportant thought runs through my mind and bothers me	☐	☐	☐	☐
I take disappointments so keenly that I can't put them out of my mind	☐	☐	☐	☐
I am a steady person	☐	☐	☐	☐
I get in a state of tension or turmoil as I think over my recent concerns and interests	☐	☐	☐	☐

End of questions.

Please inform the experimenter.

Booklet II

This booklet contains a second series of questions about:

- **Your mood**
- **Your memory of the information you just read**
- **Your thoughts about the information you just read**
- **Your knowledge about a cancer topic**
- **Your attitudes about cancer**

Some questions are very similar to those in the first booklet; this is intentional and we apologise if it's boring.

Again, once you have finished filling in this booklet, please let the experimenter know.

Mood

Please read each statement, and then mark the appropriate boxes to indicate <u>how you feel right now</u>, at this moment				
	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I feel secure	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel strained	☐	☐	☐	☐
I feel at ease	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am presently worrying over possible misfortunes	☐	☐	☐	☐
I feel satisfied	☐	☐	☐	☐
I feel frightened	☐	☐	☐	☐
I feel comfortable	☐	☐	☐	☐
I feel self-confident	☐	☐	☐	☐
I feel nervous	☐	☐	☐	☐
I am jittery	☐	☐	☐	☐
I feel indecisive	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐
I feel confused	☐	☐	☐	☐
I feel steady	☐	☐	☐	☐
I feel pleasant	☐	☐	☐	☐

Memory

Please try to recall as many words or phrases as possible from the information you were just given to read, and write them in the following lines. These can be single words or numbers, or short sentences, and you only have to write as many as you can think of. Ignore grammar and spelling.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Thought listing

You might have had positive or negative thoughts and ideas while reading the information given to you. Please list as many of these thoughts as possible; write the first thought on the first line, the second thought on the second line, and so on. Short phrases are OK, and you only have to write as many as you can think of.

Ignore grammar and spelling.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Your knowledge of HPV

Please answer the following questions about HPV. Do not worry if you are not sure about the answers or the terms used; simply answer to the best of your knowledge.

Please read each of the statements about HPV and indicate whether they are true or false by ticking (✓) the appropriate box.			
	True	False	Don't know
HPV often has no visible signs or symptoms	☐	☐	☐
A smear test will always pick up an HPV infection in the cervix	☐	☐	☐
Having many sexual partners increases the risk of getting HPV	☐	☐	☐
HPV usually has no effect on men	☐	☐	☐
HPV always causes genital warts	☐	☐	☐
HPV is related to the AIDS virus	☐	☐	☐
HPV can be transmitted during sexual intercourse	☐	☐	☐
HPV can be treated with antibiotics	☐	☐	☐
HPV is very rare	☐	☐	☐
HPV can cause cervical cancer	☐	☐	☐
HPV usually goes away without needing any treatment	☐	☐	☐
Most sexually active people will get HPV at some point in their lives	☐	☐	☐
A person always knows if they have HPV	☐	☐	☐
A person could have HPV for many years without knowing it	☐	☐	☐
Men cannot get HPV	☐	☐	☐

Evaluation

We now want to ask you some questions about the information you were given. Below you will see pairs of words with a line between them; please mark with an X on this line to indicate what you thought of the information as measured by these two words.

Did you find the information presented:

IRRELEVANT	_____	RELEVANT
SCARY	_____	NOT SCARY
NOT REASSURING	_____	REASSURING
INTERESTING	_____	BORING
PLEASANT	_____	UNPLEASANT
CONVINCING	_____	UNCONVINCING
FAMILIAR	_____	NEW
NOT FUNNY	_____	FUNNY

Please think about the message you read in answering the following questions.

When I was reading the information my instinct was to:

Want to prevent cervical cancer					Not want to prevent cervical cancer	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

When I was reading the information my instinct was to:

Want to think about cervical cancer					Not want to think about cervical cancer	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

This message was manipulative.						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

This message was misleading.						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

This message tried to manipulate me.						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

This message was exploitative.						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Worry

The following questions are designed to examine whether and how you worry about the information topic you were given, as well as some other topics.

HPV vaccination is effective in preventing cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

HPV vaccination works in the prevention of cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If I am vaccinated against HPV, I am less likely to experience cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am able to get an HPV vaccination to prevent cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I have the opportunity to get an HPV vaccination to prevent cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I can easily get an HPV vaccination to prevent cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer is severe

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer has serious negative consequences

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer is extremely harmful

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is likely that I will get cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am at risk for getting cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is possible that I will get cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Would you say that you worry about environmental concerns?

Not at all								Extremely
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
☐	☐	☐	☐	☐	☐	☐	☐	☐

How serious a problem would you estimate that environmental concerns are?

Not at all								Extremely
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
☐	☐	☐	☐	☐	☐	☐	☐	☐

Would you say that you worry about developing cervical cancer?

Not at all								Extremely
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
☐	☐	☐	☐	☐	☐	☐	☐	☐

How serious a problem would you estimate that developing cervical cancer would be?

Not at all								Extremely
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
☐	☐	☐	☐	☐	☐	☐	☐	☐

Would you say that you worry about developing breast cancer?

Not at all								Extremely
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
☐	☐	☐	☐	☐	☐	☐	☐	☐

How serious a problem would you estimate that developing breast cancer would be?

Not at all								Extremely
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
☐	☐	☐	☐	☐	☐	☐	☐	☐

Your experiences with cancer

Now we would like to ask you some questions relating to your own experiences with cancer and cancer screening.

How do you feel when you think about cancer?

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
The thought of cancer scares me	☐	☐	☐	☐	☐
When I think about cancer, I feel nervous	☐	☐	☐	☐	☐
When I think about cancer, I get upset	☐	☐	☐	☐	☐
When I think about cancer, I get depressed	☐	☐	☐	☐	☐
When I think about cancer, I get jittery	☐	☐	☐	☐	☐
When I think about cancer, my heart beats faster	☐	☐	☐	☐	☐
When I think about cancer, I feel uneasy	☐	☐	☐	☐	☐
When I think about cancer, I feel anxious	☐	☐	☐	☐	☐

How much would you say that you know about the causes of cancer?

A lot				Very little
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How confident are you in your response to the previous question?

Very confident				Not at all confident
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How much of the information given to you today was novel or new to you? (You did not know it before reading it today)				
All of it				None of it
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

Do you feel that the information given to you today has made an impact on you?				
Not at all				Very much so
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

End of questions.

Please put this booklet in the envelope & inform the experimenter.

Appendix 8. Information sources used in chapter seven.

UCL

In the UK there are about 2,800 cases of cervical cancer (cancer of the neck of the womb) per year and 1,100 deaths.

100% of cases of cervical cancer are associated with HPV (human papillomavirus) infection.

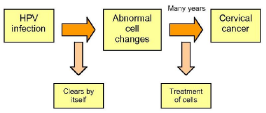
HPV is a sexually transmitted infection (STI).

UCL

About 8 out of 10 women will get HPV at some point in their lives.

Most HPV infections are cleared by the immune system.

The types of HPV that can cause cervical cancer do not have any symptoms.



UCL

Men can carry the HPV virus, but in most cases, the types of HPV that cause cervical cancer do not have harmful health effects for men.

At present there is no direct treatment for HPV itself, but the abnormal cells that the virus causes can be removed very easily to prevent cancer developing.

These cell changes in the cervix are detected by cervical screening.

Appendix 9. Questionnaires used in chapter seven.

Booklet I

Thank you for attending this session. This booklet contains a series of questions about:

- **You and your background**
- **Your experiences with cancer**

Your answers will be treated with the strictest confidence and will be used to develop health information. If you are unsure about any questions or issues, please feel free to ask the experimenter at any time. There will also be an opportunity to ask questions at the end of this session.

Once you have finished filling in the booklet, please let the experimenter know.

Your experiences with cancer

Now we would like to ask you some questions relating to your own experiences with cancer and cancer screening.

Have you, your family or close friends had cancer? (please tick all that apply)

- ☐ You
- ☐ Partner
- ☐ Close family member
- ☐ Other family member
- ☐ Close Friend
- ☐ Other Friend
- ☐ Not sure
- ☐ Do not wish to answer

How much would you say that you know about the causes of cancer?

Very little				A lot
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How confident are you in your response to the previous question?

Very confident				Not at all confident
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How much would you say that you know about the things you can do to lower your own risk of getting cancer?

Very little				A lot
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

How confident are you in your response to the previous question?

Very confident				Not at all confident
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

	Much below average	Below average	Average for women my age	Above average	Much above average
Compared to other women your age, what do you think that your chances of getting cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *cervical* cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *breast* cancer are?	☐	☐	☐	☐	☐

Have you ever heard of HPV?	
Yes ☐	No ☐

If YES, Please use the following space to briefly outline what you know about HPV.

Would you want to talk to a potential partner about sexually transmitted infections before engaging in unprotected sex?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

Would you want to talk to a potential partner about HPV before engaging in unprotected sex?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a general STI test in the next 3 months, how likely is it that you would have the test?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a smear test in the next 3 months, how likely is it that you would have the test?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a test for HPV in the next 3 months, how likely is it that you would have the test?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were invited to have HPV vaccination in the next 3 months, how likely would you be to have the vaccination?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very (7)
☐	☐	☐	☐	☐	☐	☐

The following questions are designed to find out how you associate certain words and phrases with the thought of **cancer**. Please mark a number between each of the following pairs of words to indicate which is closer to how you think about **cancer**. Please respond quickly with your initial gut feeling; that is, with at little thought as possible.								
Painless	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Severe, constant, untreatable pain
No fear	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Terror
Body mutilation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No body changes
Pleasant odours	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Foul odours
Independency	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Dependency
No life changes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Sudden, overwhelming life changes
Extreme suffering	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No suffering
Nourished	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Wasting away
Certain future	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Uncertain future
Destructive, uncontained growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Normal growth
Punishment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No punishment
Worthlessness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Worth
Shame	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Pride
Acceptance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Rejection
Alienation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Belonging
Being wanted	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Not being wanted
Unloved	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Loved
Abandoned	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Cared for
Hopefulness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Hopelessness
Certain death	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Being cured
Helplessness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Control
Optimism	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Pessimism
Unknown	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Known

Mood

Please read each statement and then mark the appropriate boxes to indicate <u>how you feel right now</u>:				
	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐

A number of statements which people have used to describe themselves are given below. Read each statement and then indicate to the right how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	Not at all	Somewhat	Moderately	Very much
I feel pleasant	☐	☐	☐	☐
I feel nervous and restless	☐	☐	☐	☐
I feel satisfied with myself	☐	☐	☐	☐
I wish I could be as happy as others seem to be	☐	☐	☐	☐
I feel like a failure	☐	☐	☐	☐
I feel rested	☐	☐	☐	☐
I am "cool, calm, and collected"	☐	☐	☐	☐
I feel that difficulties are piling up so that I cannot overcome them	☐	☐	☐	☐
I worry too much over something that doesn't really matter	☐	☐	☐	☐
I am happy	☐	☐	☐	☐
I have disturbing thoughts	☐	☐	☐	☐
I lack self-confidence	☐	☐	☐	☐
I feel secure	☐	☐	☐	☐
I make decisions easily	☐	☐	☐	☐
I feel inadequate	☐	☐	☐	☐
I am content	☐	☐	☐	☐
Some unimportant thought runs through my mind and bothers me	☐	☐	☐	☐
I take disappointments so keenly that I can't put them out of my mind	☐	☐	☐	☐
I am a steady person	☐	☐	☐	☐
I get in a state of tension or turmoil as I think over my recent concerns and interests	☐	☐	☐	☐

ARE SOME QUESTIONS ABOUT YOUR FEELINGS, BELIEFS AND BEHAVIOUR.

	Definitely false	Mostly false	Undecided/ equally true and false	Mostly true	Definitely true
I have a logical mind	☐	☐	☐	☐	☐
Knowing the answer without having to understand the reasoning behind it is good enough for me	☐	☐	☐	☐	☐
When it comes to trusting people, I can usually rely on my 'gut feelings'	☐	☐	☐	☐	☐
I don't think it is a good idea to rely on one's intuition for important decisions	☐	☐	☐	☐	☐
I am not a very analytical thinker	☐	☐	☐	☐	☐
I prefer complex to simple problems	☐	☐	☐	☐	☐
I suspect my hunches are often inaccurate	☐	☐	☐	☐	☐
I often go by my instincts when deciding on a course of action	☐	☐	☐	☐	☐
I am much better at figuring things out logically than most people	☐	☐	☐	☐	☐
I trust my initial feelings about people	☐	☐	☐	☐	☐
I generally don't depend on my feelings to help me make decisions	☐	☐	☐	☐	☐
If I were to rely on my 'gut feelings', I would often make mistakes	☐	☐	☐	☐	☐
I am not very good at solving problems that require careful logical analysis	☐	☐	☐	☐	☐
I like to rely on my first impressions	☐	☐	☐	☐	☐
I enjoy problems that require hard thinking	☐	☐	☐	☐	☐
I believe in trusting my hunches	☐	☐	☐	☐	☐
I don't like situations in which I have to rely on intuition	☐	☐	☐	☐	☐
I don't like to have to do a lot of thinking	☐	☐	☐	☐	☐
Using logic usually works well for me in figuring out problems in my life	☐	☐	☐	☐	☐
I don't have a very good sense of intuition	☐	☐	☐	☐	☐
I think there are times when one should rely on one's intuition	☐	☐	☐	☐	☐
I enjoy intellectual challenges	☐	☐	☐	☐	☐
Reasoning things out carefully is not one of my strong points	☐	☐	☐	☐	☐
I try to avoid situations that require thinking about something	☐	☐	☐	☐	☐

End of questions. Please inform the experimenter.

Booklet II

This booklet contains a second series of questions about:

- **Your mood**
- **Your memory of the information you just read**
- **Your thoughts about the information you just read**
- **Your knowledge about a cancer topic**
- **Your attitudes about cancer**

Some questions are very similar to those in the first booklet; this is intentional and we apologise if it's boring.

Again, once you have finished filling in this booklet, please let the experimenter know.

Mood

Please read each statement and then mark the appropriate boxes to indicate <u>how you feel right now</u>:	Not at all	Somewhat	Moderately	Very much
I feel calm	☐	☐	☐	☐
I am tense	☐	☐	☐	☐
I feel upset	☐	☐	☐	☐
I am relaxed	☐	☐	☐	☐
I feel content	☐	☐	☐	☐
I am worried	☐	☐	☐	☐

	Much below average	Below average	Average for women my age	Above average	Much above average
Compared to other women your age, what do you think that your chances of getting cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *cervical* cancer are?	☐	☐	☐	☐	☐
Compared to other women your age, what do you think that your chances of getting *breast* cancer are?	☐	☐	☐	☐	☐

Your knowledge of HPV

Please answer the following questions about HPV. Do not worry if you are not sure about the answers or the terms used; simply answer to the best of your knowledge.

Please read each of the statements about HPV and indicate whether they are true or false by ticking (✓) the appropriate box.			
	True	False	Don't know
HPV often has no visible signs or symptoms	☐	☐	☐
A smear test will always pick up an HPV infection in the cervix	☐	☐	☐
Having many sexual partners increases the risk of getting HPV	☐	☐	☐
HPV usually has no effect on men	☐	☐	☐
HPV always causes genital warts	☐	☐	☐
HPV is related to the AIDS virus	☐	☐	☐
HPV can be transmitted during sexual intercourse	☐	☐	☐
HPV can be treated with antibiotics	☐	☐	☐
HPV is very rare	☐	☐	☐
HPV can cause cervical cancer	☐	☐	☐
HPV usually goes away without needing any treatment	☐	☐	☐
Most sexually active people will get HPV at some point in their lives	☐	☐	☐
A person always knows if they have HPV	☐	☐	☐
A person could have HPV for many years without knowing it	☐	☐	☐
Men cannot get HPV	☐	☐	☐

Your attitudes towards health, cancer and scientific progress

Please read the following statements, and mark the appropriate box to indicate how strongly you agree or disagree with each.

	Strongly Disagree	Disagree	Agree	Strongly Agree
In uncertain times, I usually expect the best.	☐	☐	☐	☐
It's easy for me to relax.	☐	☐	☐	☐
If something can go wrong for me, it will.	☐	☐	☐	☐
I'm always optimistic about my future.	☐	☐	☐	☐
I enjoy my friends a lot.	☐	☐	☐	☐
It's important for me to keep busy.	☐	☐	☐	☐
I hardly ever expect things to go my way.	☐	☐	☐	☐
I don't get upset too easily.	☐	☐	☐	☐
I cannot count on good things happening to me.	☐	☐	☐	☐
Overall, I expect more good things to happen to me than bad.	☐	☐	☐	☐
It seems like almost everything causes cancer.	☐	☐	☐	☐
There's not much I can do to reduce my chances of getting cancer.	☐	☐	☐	☐
There are so many recommendations about preventing cancer that it's hard to know which ones to follow.	☐	☐	☐	☐
If I have cancer, it can't be cured anyway, so why bother to check.	☐	☐	☐	☐
I can control whether or not I develop cancer at some time during my life.	☐	☐	☐	☐
It is likely that I will develop cancer in my lifetime.	☐	☐	☐	☐
I am confident that I will remain free of cancer for the rest of my life.	☐	☐	☐	☐
If I get cancer, it is my own behaviour which determines how quickly I get well again.	☐	☐	☐	☐
No matter what I do, if I am going to get cancer, I will get cancer.	☐	☐	☐	☐
Having regular contact with my physician is the best way for me to avoid cancer.	☐	☐	☐	☐
Avoiding cancer is largely a matter of good fortune.	☐	☐	☐	☐
If I take care of myself, I can avoid cancer.	☐	☐	☐	☐
I am in control of my health.	☐	☐	☐	☐
Most things that affect my health happen to me by accident. If it's meant to be, I will stay healthy.	☐	☐	☐	☐
The main thing that affects cancer is what I myself do.	☐	☐	☐	☐

Some people have negative (unhappy) beliefs about cancer. What do you believe?	Strongly Disagree	Disagree	Agree	Strongly Agree
If someone is meant to have cancer, it doesn't matter what kind of lifestyle they lead (e.g. exercise, eat healthy foods), they will get cancer anyway	☐	☐	☐	☐
If someone gets cancer, it was meant to be	☐	☐	☐	☐
If someone gets cancer, that's the way they were meant to die	☐	☐	☐	☐
If cancer is caught in its early stages the treatment for it is more straight forward	☐	☐	☐	☐
If someone has cancer, it is already too late to get treated for it	☐	☐	☐	☐
Someone can lead an unhealthy lifestyle all their life (e.g. not exercise, smoke, eat fatty foods), and if they are not meant to get cancer, they won't get it	☐	☐	☐	☐
If someone is meant to get cancer, they will get it no matter what they do	☐	☐	☐	☐
If someone gets cancer, their time to die is soon	☐	☐	☐	☐
Getting checked for cancer makes people scared that they may really have cancer	☐	☐	☐	☐
If someone is meant to have cancer, they will have cancer	☐	☐	☐	☐
If someone gets cancer, it doesn't matter whether they find it early or late, they will still die from it	☐	☐	☐	☐
A person needs the same treatment for cancer whether it is found 'early' or 'late'	☐	☐	☐	☐
If someone was meant to have cancer, it doesn't matter what doctors and nurses tell them to do, they will get cancer anyway	☐	☐	☐	☐
If someone has cancer and gets treatment for it, they will probably still die from the cancer	☐	☐	☐	☐
If cancer is caught early it helps a person avoid some of the unpleasant treatments for the disease (such as chemotherapy)	☐	☐	☐	☐
If someone is meant to have cancer, it doesn't matter if they have a healthy lifestyle (e.g. don't smoke, eat healthy foods, exercise regularly), they will still get cancer	☐	☐	☐	☐
Some people don't want to know if they have cancer because they don't want to know they may be dying from it	☐	☐	☐	☐
Cancer will kill someone no matter when it is found and how it is treated	☐	☐	☐	☐
If someone gets cancer they always need chemotherapy to treat it	☐	☐	☐	☐
If cancer is caught in its early stages it is easier to cure	☐	☐	☐	☐

Would you want to talk to a potential partner about sexually transmitted infections before engaging in unprotected sex?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

Would you want to talk to a potential partner about HPV before engaging in unprotected sex?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a general STI test in the next 3 months, how likely is it that you would have the test?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a smear test in the next 3 months, how likely is it that you would have the test?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were offered a test for HPV in the next 3 months, how likely is it that you would have the test?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very likely (7)
☐	☐	☐	☐	☐	☐	☐

If you were invited to have HPV vaccination in the next 3 months, how likely would you be to have the vaccination?

Very unlikely (1)	(2)	(3)	(4)	(5)	(6)	Very (7)
☐	☐	☐	☐	☐	☐	☐

We now want to ask you some questions about the information you were given. Below you will see pairs of words with a line between them; please mark with an X on this line to indicate what you thought of the information as measured by these two words.

Did you find the information presented:

IRRELEVANT	_____	RELEVANT
SCARY	_____	NOT SCARY
FACTUAL	_____	NOT FACTUAL
UNEMOTIONAL	_____	EMOTIONAL
NOT REASSURING	_____	REASSURING
INTERESTING	_____	BORING
PLEASANT	_____	UNPLEASANT
CONVINCING	_____	UNCONVINCING
FAMILIAR	_____	NEW
NOT FUNNY	_____	FUNNY

Worry

The following questions are designed to examine whether and how you worry about the information topic you were given, as well as some other topics.

HPV vaccination is effective in preventing cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

HPV vaccination works in the prevention of cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If I am vaccinated against HPV, I am less likely to experience cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am able to get an HPV vaccination to prevent cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I have the opportunity to get an HPV vaccination to prevent cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I can easily get an HPV vaccination to prevent cervical cancer

Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer is severe						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer has serious negative consequences						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer is extremely harmful						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is likely that I will get cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am at risk for getting cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is possible that I will get cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

"Some people have suggested that the responses we have to new information can be classified as emotional or rational. Emotional means that it made you feel something; for example, sadness, or happiness, or anger. Rational on the other hand would mean that it got you thinking in a way that wasn't necessarily related to emotion."

Would you say you had an emotional response to the material?

Not at all				Very much so
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

Would you say that your response to the material was rational or analytical? (did it make you think?

Not at all				Very much so
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

Would you say that your response was similar to that of an average person?

Not at all				Very much so
(1)	(2)	(3)	(4)	(5)
☐	☐	☐	☐	☐

In the space below, please try to summarise the 'gist' of the information in the leaflet in one short sentence.

In the space below, please try to summarise your own response to the leaflet in one short sentence.

Appendix 10. Open-ended responses from Chapter seven.

Open-ended responses to environmental information.

Gist	Response
The UK population does not recycle enough, and this is often blamed on inconvenience. (JO)	People do not care because the effects are far off. (CE)
Facts about how much waste is produced, and possible solutions. (FG)	Need to think about the kind of recycling we/I can do in the UK. (BO, BS)
People don't recycle enough and a lot goes to waste that could be recycled, and other countries recycle more. (JO,FG)	I should try to recycle more. (BS)
Just recycle! It should be easier & people should take more responsibility (JO)	Recycling is easy and people should be more positive about it (EMP)
People should be well informed about these facts (JO, FG)	Found it interesting (EP)
Prevention is better than cure (P)	Thought of own behaviour in relation to recommendations (BS)
Statistics shows that many people don't recycle (FG, JO)	Made me think about the issues, but wanted to know more about strategies (EN)
Recycling helps to prevent environmental problems (CE, FG)	We should recycle to prevent environmental problems (BS, BO)
The UK's failure in recycling is damaging the environment (CE, FS)	I ought to make a more concerted effort to recycle (BS)
A lot of the waste that is currently binned can be recycled (FG)	Knew this information already (FA)
Facts about recycling (FG)	Information is familiar, but it's good to read again because people should know this info (FA, EMP)
People in the UK do not recycle as much as they should (JO, FS)	I should make more of an effort to recycle (BS)
Recycling is essential if we are to avoid environmental problems. (P,CE)	Made me think about the problem again. Want to make serious effort to use less plastics and educate others that I know. (BS, BO)
Despite plenty of facilities, the UK doesn't recycle as much as it could (or our EU neighbours) (JO, FS)	Agree very much with all facts. I see so much go to waste at my workplace and it makes me uncomfortable. (EP, EMN)
recycling helps prevent environmental problems (P, FG)	I should make an effort to recycle (BS)
It is important to increase recycling efforts in the UK to try and prevent against inevitable environmental problems (CE, FG, P)	None of the information was new, but I am interested in environmental issues. Not particularly interested in the leaflet. (FA, EN)
Attempted to raise awareness of environmental problems and use of recycling (FG)	It reminded me of environmental issues, and made me proud that my own recycling makes a difference to the environment (EMP, BS, CE)
We waste many recyclable materials, unlike Europe (FG, JO)	Our nation is very poor at recycling and we could do more (BS)
Recycling helps the environments (CE, FG)	I should recycle when I can (BS)

Open-ended responses to breast cancer information.

Gist	Response
Breast cancer can be treated if detected early (P, FS)	Breast cancer isn't as scary as previously thought (EMP)
Showed stats on breast cancer and that screening is an early detection tool. (ST, P, FG)	Factual, simple, positive, and very easy to understand. (EP)
Factual information with emotional connections (FG)	Shock at breast cancer figures (EMN)
Breast cancer is a reality: be aware of the facts. (FG)	Not much!
It is always worth getting checked for breast cancer (P, FG)	Factual & sensible information (FG, EP)
Facts and figures about likelihood of breast cancer (FG)	Hope it isn't me! (RI)
Post-menopausal women should be screened for breast cancer. Screening isn't as bad as it may seem.	Informative, useful, well-presented. (EP)
Statistical info on consequences of breast cancer (FG, ST)	Quite negative, but appreciate the straightforwardness (EMN, EP)
Factual stats: e.g. less than 50% women diagnosed with breast cancer die of it (FS, ST)	Comforting (especially point about survival) and interesting, but quite basic and familiar (FA, EMP)
Fewer people die from breast cancer if it is treated early so people should attend breast screening (FS, P)	The advice (to have mammograms) provided was very important (P, EP)
Women over 50 more likely to get breast cancer and should therefore get mammograms every 3 years (RI, FS, P)	I am familiar with and understand this information (FA)
High percentage of women have breast cancer, post-menopause women are most at risk. (RI, FS)	Informative, but don't like to worry myself thinking about such things. I get regular checks and try to takecare of myself to avoid getting it. (EMN, EP, BS)
There are many cases of breast cancer every year in the UK, but unfortunately only access to breast cancer screening for women over 50. (P, RI)	Once I turn 50 I must get screened for breast cancer. (BS)
Breast cancer is one of the most common cancers in post-menopausal women and can be detectedusing breast screening. (FS, P, RI)	Interesting; didn't realise that there were so many cases and deaths per year. (EP, RI)
Under 30's are at lower risk of breast cancer, and most women who get breast cancer live beyond 5 years. (RI, FS)	Reassuring to know that despite the hype over breast cancer in the media, it is rare amongst young women and it can be treated if detected. (RI, P)
Breast cancer common in older women but can be caught early with screening (FS, P, RI)	I want to check that my mum is being screened regularly (BS, BO, P)
About the incidence and mortality from breast cancer and chance of survival in 5 years (RI, FG)	Mixture of biological interest in the given facts/figures, and feelings of fear about the stats (EMN, EP, ST)
Cancer does not necessarily target bad or unhealthy people, and everyone has risks, 1 in 9 women get it. (RI, FS, ST)	Stats are informative and helpful (EP)
Breast cancer can and should be screened in women over 50 (JP, FS)	As I get older I am more at risk of breast cancer (RI)
Only 20% of those diagnosed with breast cancer die from it (ST, FS)	Gives me hope in the event that I should get breast cancer (EMP)

Open-ended responses to HPV/cervical cancer information.

Gist	Response
People should be aware of cervical cancer and be tested (FG, BO)	The publicity of cancer has increased recently, and we know that there are known and unknown risks. (RI)
Most people get HPV, but they shouldn't go on to get cervical cancer because they can go for screening. (P, FS, RI)	Generally positive and I agree with it (EP)
HPV is an STI that causes cervical cancer in women, is very widespread with subtle side effects, vaccine is available. (FS, P, CE)	Was not aware of HPV before, was surprised by how widespread infection is, and by own possible risk. (RI, EMN)
Unprotected sex can raise risk of HPV infection. Screening can prevent development of cervical cancer after infection. (RI, P, FS)	Will definitely go for screening when I am able (BS)
HPV is key to development of cervical cancer (FS, CE)	Interesting and useful (EP)
HPV is an STI that causes cervical cancer, can be vaccinated against (FS, CE, P)	Positive information about cancer, nice change (EP, EMP)
STI that causes cervical cancer but screening and vaccination can prevent it (FS, CE, P)	People should be aware of this information to prevent development of cervical cancer (BO)
Men not affected, but can pass on to women (FS)	Liked the clear factual approach (EP)
HPV infection causes cervical cancer. (CE, FS)	Liked hearing about the statistics (S, EP)
Women are at risk from HPV while having unprotected sex, but HPV vaccination and smear tests can help prevent the onset of cervical cancer (RI, FS, P)	Important not to have unprotected sex, be aware of risks of symptomless STIs and have regular checkups to reduce risk of developing cervical cancer (BS, RI)
HPV is a common STI and most women get it unknowingly, and in some cases can lead to cervical cancer. (RI, CE, FS)	I am unlikely to get HPV due to my lifestyle, but even if I did I would be protected by other precautionary measures (RI, BS)
HPV is common and can in some cases lead to cervical cancer. (RI, CE, FS)	Need to have regular checkups for HPV to prevent cervical cancer. (BS, CE)
Cervical cancer is caused by HPV but HPV doesn't always cause cervical cancer. Screening can identify and treat mutated cells (FS, CE, P)	Interesting; did not know this information before. (NO)
HPV is common and can lead to cervical cancer, so should be taken seriously; so have a smear done. (RI, FS, BO, CE)	I am likely to attend smears and not engage in lots of unprotected sex, so my chances of getting HPV are reduced (RI, BS)
8/10 women will get HPV in their lifetime. Easily cured if caught early, men are carriers but are not affected by HPV. (RI, FS, P)	Very informative, concise and reassuring.(EP, EMP)
HPV is an STI which can cause cervical cancer but is treatable if detected. Early screening and vaccination is available. (CE , FS)	Very good & informative leaflet highlighting main points about HPV and cervical cancer. Neutral in tone; not intimidating. (EP, EMP)
HPV is carried by men, but affects only women (with cancer on occasion) (FS)	Women like me get cervical cancer and I am at risk (RI)
Anyone can get cancer, but it is also preventable (CE, P, FG)	Informative; made me think seriously about my own risk of getting cancer and how I could avoid it (EP, RI, BS)
Important to get regular cervical screening, so you know whether you have HPV. It affects a lot of women and often lies dormant. (RI, FS, P)	Am likely to get HPV in future, so must go for regular screenings. (RI, BS)
HPV transmitted through unprotected sex, can develop into cervical cancer in women in later life if not detected and treated. (RI, CE, P)	I should not be complacent that my last STI test was fine, despite being in a committed relationship. I should also not be complacent that my partner will always be clean and committed, and that my own sexual health is the primary concern. (BS, RI)

Appendix 11. Stimuli used in SC-IAT (Chapters five, six and eight).

Target Category	Evaluative categories	
Cancer	Scary	Funny
Tumour	Spooky	Amusing
Radiation	Shocking	Witty
Illness	Fearful	Comical
Remission	Frightening	Loony
Smear	Horrifying	Jokey
Surgery	Terrible	Side-splitting
Screening	Ghastly	Jolly
	Dreadful	Witty
	Terrifying	Whimsical
	Chilling	Humorous

Appendix 12. Stimuli used in SC-IAT (Chapters seven and eight).

Target Category	Evaluative categories	
Cancer	Scary	Funny
Tumour	Destroy	Happy
Radiation	Dislike	Loving
Illness	Evil	Pleasure
Remission	Horrible	Excellent
Smear	Nasty	Superb
Surgery	Unpleasant	Wonderful
Screening	Tragic	Fabulous
	Ugly	Glad
	Terrible	Beautiful
	Disaster	Splendid

Appendix 13. Configurations of Risk Behaviour Diagnosis Scale as adapted to breast cancer, environmental issues and HPV/cervical cancer.

Risk behaviour diagnosis scale: breast cancer and mammography

Breast screening is effective in preventing breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Breast screening works in the prevention of breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If I attend breast screening, I am less likely to experience breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am able to attend breast screening to prevent breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I have the opportunity to attend breast screening to prevent breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I can easily attend breast screening to prevent breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that breast cancer is severe						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that breast cancer has serious negative consequences						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that breast cancer is extremely harmful						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is likely that I will get breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am at risk for getting breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is possible that I will get breast cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Risk behaviour diagnosis scale: cervical cancer and HPV vaccination

HPV vaccination is effective in preventing cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

HPV vaccination works in the prevention of cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If I am vaccinated against HPV, I am less likely to experience cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am able to get an HPV vaccination to prevent cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I have the opportunity to get an HPV vaccination to prevent cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I can easily get an HPV vaccination to prevent cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer is severe						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer has serious negative consequences						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that cervical cancer is extremely harmful						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is likely that I will get cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am at risk for getting cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is possible that I will get cervical cancer						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Risk behaviour diagnosis scale: the environment and recycling

Recycling is effective in preventing environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Recycling works in the prevention of environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

If I recycle, I am less likely to experience environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am able to recycle to prevent environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I have the opportunity to recycle to prevent environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I can easily recycle to prevent environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that environmental problems are severe						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that environmental problems have serious negative consequences						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I believe that environmental problems are extremely harmful						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is likely that I will experience environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

I am at risk for experiencing environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

It is possible that I will experience environmental problems						
Strongly disagree						Strongly agree
(1)	(2)	(3)	(4)	(5)	(6)	(7)
☐	☐	☐	☐	☐	☐	☐

Appendix 14. Burns cancer attitudes instrument.

The following questions are designed to find out how you associate certain words and phrases with the thought of **cancer**. Please mark a number between each of the following pairs of words to indicate which is closer to how you think about **cancer**. Please respond quickly with your initial gut feeling; that is, with at little thought as possible.								
Painless	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Severe, constant, untreatable pain
No fear	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Terror
Body mutilation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No body changes
Pleasant odours	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Foul odours
Independency	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Dependency
No life changes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Sudden, overwhelming life changes
Extreme suffering	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No suffering
Nourished	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Wasting away
Certain future	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Uncertain future
Destructive, uncontained growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Normal growth
Punishment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	No punishment
Worthlessness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Worth
Shame	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Pride
Acceptance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Rejection
Alienation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Belonging
Being wanted	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Not being wanted
Unloved	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Loved
Abandoned	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Cared for
Hopefulness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Hopelessness
Certain death	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Being cured
Helplessness	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Control
Optimism	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Pessimism
Unknown	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Known

Appendix 15. Rational versus Experiential Inventory instrument.

	Definitely false	Mostly false	Undecided/ equally true and false	Mostly true	Definitely true
I have a logical mind	☐	☐	☐	☐	☐
Knowing the answer without having to understand the reasoning behind it is good enough for me	☐	☐	☐	☐	☐
When it comes to trusting people, I can usually rely on my 'gut feelings'	☐	☐	☐	☐	☐
I don't think it is a good idea to rely on one's intuition for important decisions	☐	☐	☐	☐	☐
I am not a very analytical thinker	☐	☐	☐	☐	☐
I prefer complex to simple problems	☐	☐	☐	☐	☐
I suspect my hunches are often inaccurate	☐	☐	☐	☐	☐
I often go by my instincts when deciding on a course of action	☐	☐	☐	☐	☐
I am much better at figuring things out logically than most people	☐	☐	☐	☐	☐
I trust my initial feelings about people	☐	☐	☐	☐	☐
I generally don't depend on my feelings to help me make decisions	☐	☐	☐	☐	☐
If I were to rely on my 'gut feelings', I would often make mistakes	☐	☐	☐	☐	☐
I am not very good at solving problems that require careful logical analysis	☐	☐	☐	☐	☐
I like to rely on my first impressions	☐	☐	☐	☐	☐
I enjoy problems that require hard thinking	☐	☐	☐	☐	☐
I believe in trusting my hunches	☐	☐	☐	☐	☐
I don't like situations in which I have to rely on intuition	☐	☐	☐	☐	☐
I don't like to have to do a lot of thinking	☐	☐	☐	☐	☐
Using logic usually works well for me in figuring out problems in my life	☐	☐	☐	☐	☐
I don't have a very good sense of intuition	☐	☐	☐	☐	☐
I think there are times when one should rely on one's intuition	☐	☐	☐	☐	☐
I enjoy intellectual challenges	☐	☐	☐	☐	☐
Reasoning things out carefully is not one of my strong points	☐	☐	☐	☐	☐
I try to avoid situations that require thinking about something	☐	☐	☐	☐	☐

Appendix 16. HPV Knowledge Scale.

Your knowledge of HPV

Please answer the following questions about HPV. Do not worry if you are not sure about the answers or the terms used; simply answer to the best of your knowledge.

Please read each of the statements about HPV and indicate whether they are true or false by ticking (✓) the appropriate box.			
	True	False	Don't know
HPV often has no visible signs or symptoms	☐	☐	☐
A smear test will always pick up an HPV infection in the cervix	☐	☐	☐
Having many sexual partners increases the risk of getting HPV	☐	☐	☐
HPV usually has no effect on men	☐	☐	☐
HPV always causes genital warts	☐	☐	☐
HPV is related to the AIDS virus	☐	☐	☐
HPV can be transmitted during sexual intercourse	☐	☐	☐
HPV can be treated with antibiotics	☐	☐	☐
HPV is very rare	☐	☐	☐
HPV can cause cervical cancer	☐	☐	☐
HPV usually goes away without needing any treatment	☐	☐	☐
Most sexually active people will get HPV at some point in their lives	☐	☐	☐
A person always knows if they have HPV	☐	☐	☐
A person could have HPV for many years without knowing it	☐	☐	☐
Men cannot get HPV	☐	☐	☐

Appendix 17. Ethics documents and correspondence.

HEALTH BEHAVIOUR UNIT
DEPARTMENT OF EPIDEMIOLOGY AND PUBLIC HEALTH
UNIVERSITY COLLEGE LONDON

sent to Godolphin & Latymer & The Haldegrave School

29th November 2007

Dear [contact],

I'm writing to you from Cancer Research UK's Health Behaviour Unit, which is part of University College London. Earlier this year, your school took part in a research study exploring adolescent's responses to information about a new vaccine for human papillomavirus (HPV) and cervical cancer. The study went very well, and I enclose a very brief report summarising the findings. I would once again like to thank you for your school's contribution to the study, and for the help from your staff.

We are planning a second study early in 2008, and would like to invite your school to take part again. It will be similar to the previous one (again, exploring girls' attitudes towards information about HPV), and we will be happy to offer similar compensation to the school.

I know that Gareth Lloyd has been in touch with you and I believe that you are willing to take part. We are very grateful for your help and should be happy to answer any questions you have about either study.

With best wishes

Yours sincerely,

Jane Wardle PhD FBPS
Professor of Clinical Psychology
Director, Cancer Research UK Health Behaviour Unit

j.wardle@ucl.ac.uk
020 7679 6642

UCL Department of Epidemiology and Public Health
Health Behaviour Unit
University College London, 2-16 Torrington Place, London WC1E 6BT
Tel: +44 (0)20 7679 6642 Fax: +44 (0)20 7813 2848
www.ucl.ac.uk/hbu/

Director *Professor Jane Wardle*
Deputy Director *Professor Robert West*

The Godolphin and Latymer School

Iffley Road, Hammersmith, London. W6 0PG

From the Head Mistress:
Miss Margaret Rudland, B.Sc.

Telephone: 020 8741 1936
Facsimile: 020 8746 3352

9 May 2007

Dr Lucy Cooke
Research Psychologist
UCL
Health Behaviour Unit
Department of Epidemiology and Public Health
2-16 Torrington Place
London
WC1E 6BT

Dear Dr Cooke,

Thank you for your letter of 4 May concerning your research. I have discussed the matter with Dr Louise Miller, our School Doctor, and we are more than happy to agree to help you with the project.

I look forward to hearing from you and receiving further information.

Yours sincerely
Margaret Rudland.

HEALTH BEHAVIOUR UNIT
DEPARTMENT OF EPIDEMIOLOGY AND PUBLIC HEALTH
UNIVERSITY COLLEGE LONDON

07th January 2008

Dear [contact],

I'm writing to you from Cancer Research UK's Health Behaviour Unit, which is part of University College London. Last year, your school took part in a research study exploring adolescent's responses to information about a new vaccine for human papillomavirus (HPV) and cervical cancer. The study went very well, and I enclose a very brief report summarising the findings. I would once again like to thank you for your school's contribution to the study, and for the help from your staff.

We are now planning a second study and would like to invite your school to take part again. It will be similar to the previous one (again, exploring girls' attitudes towards information about HPV), and we will be happy to offer similar compensation to the school.

I know that Gareth Lloyd has been in touch with staff at your school and I believe that an interest has been shown in taking part. We are very grateful for your help and should be happy to answer any questions you have about either study.

With best wishes

Yours sincerely,

Jane Wardle PhD FBPS
Professor of Clinical Psychology
Director, Cancer Research UK Health Behaviour Unit

j.wardle@ucl.ac.uk
020 7679 6642

UCL Department of Epidemiology and Public Health
Health Behaviour Unit
University College London, 2-16 Torrington Place, London WC1E 6BT
Tel: +44 (0)20 7679 6642 Fax: +44 (0)20 7813 2848
www.ucl.ac.uk/hbu/

Director *Professor Jane Wardle*
Deputy Director *Professor Robert West*

Evaluating adolescent girls' reactions to HPV information

Background

Human papillomaviruses (HPV) are the cause of the majority of cervical cancers. HPV infections are sexually transmitted, and are extremely common. Although the UK runs a highly successful cervical screening programme, around 3000 women get the disease every year, and around a further 1000 die from it. These numbers could be further reduced by preventing HPV infection through vaccination. Highly effective vaccines against HPV have already been developed, and are scheduled for use in a UK nationwide, schools-based vaccination programme beginning in 2008.

Ahead of this vaccination programme, there are concerns over what information about HPV will be appropriate for women, and whether age affects the reactions that women have. Our research examined the reactions and responses of adolescent girls who will be around the age to actually receive the vaccination next year.

Methods

Girls were given one of three leaflets, containing information about either HPV, Chlamydia or recycling. The purpose of using these other leaflets was to compare reactions to HPV information with reactions to other, more accepted forms of information. Girls reactions were measured using questions in a survey, designed to find out their knowledge of HPV, their moods, and their thoughts about future vaccination and cervical screening.

Results

Encouragingly, girls displayed generally positive reactions to HPV information. Few participants had heard of HPV before, but results indicated that they were interested, their knowledge about HPV increased after reading the leaflet, and many wanted to find out more about HPV in discussions. Participants given HPV information expressed more interest in future HPV vaccination than those given alternative information, although there were no differences in terms of intentions to attend cervical screening or to have a test for HPV if they are offered one in the future. Our findings show that adolescent girls show a particular interest in information about HPV, and this information does not have a negative impact on their mood states.

UCL GRADUATE SCHOOL
UCL RESEARCH ETHICS COMMITTEE

Professor Jane Wardle
Director of Cancer Research Health Behaviour Research Centre
Department of Epidemiology and Public Health
UCL
Brook House
2-16 Torrington Place
London
WC1E 5BT

25 July 2008

Dear Professor Wardle

Notification of Ethical Approval
Project ID/Title: 1606/001: Associative and deliberative reactions to affective materials

I am pleased to confirm that in my capacity a Chair of the UCL Research Ethics Committee I have approved your project for the duration of the study.

Approval is subject to the following conditions:

1. You must seek Chair's approval for proposed amendments to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing the 'Amendment Approval Request Form'.

The form identified above can be accessed by logging on to the ethics website homepage.
http://www.grad.ucl.ac.uk/ethics/ and clicking on the button marked 'Responsibilities Following Approval'.

2. It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. Both non-serious and serious adverse events must be reported.

Reporting Non-Serious Adverse Events
For non-serious adverse events you will need to inform Ms Helen Dougal, Ethics Committee Administrator (h.dougal@ucl.ac.uk), within ten days of an adverse incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair or Vice-Chair of the Ethics Committee will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Reporting Serious Adverse Events
The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator immediately the incident occurs. Where the adverse incident is unexpected and serious, the Chair or Vice-Chair will decide whether the study should be terminated pending the opinion of an independent expert. The adverse event will be considered at the next Committee meeting and a decision will be made on the need to change the information leaflet and/or study protocol.

On completion of the research you must submit a brief report (a maximum of two sides of A4) of your findings/concluding comments to the Committee, which includes in particular issues relating to the ethical implications of the research.

Good luck with the project.

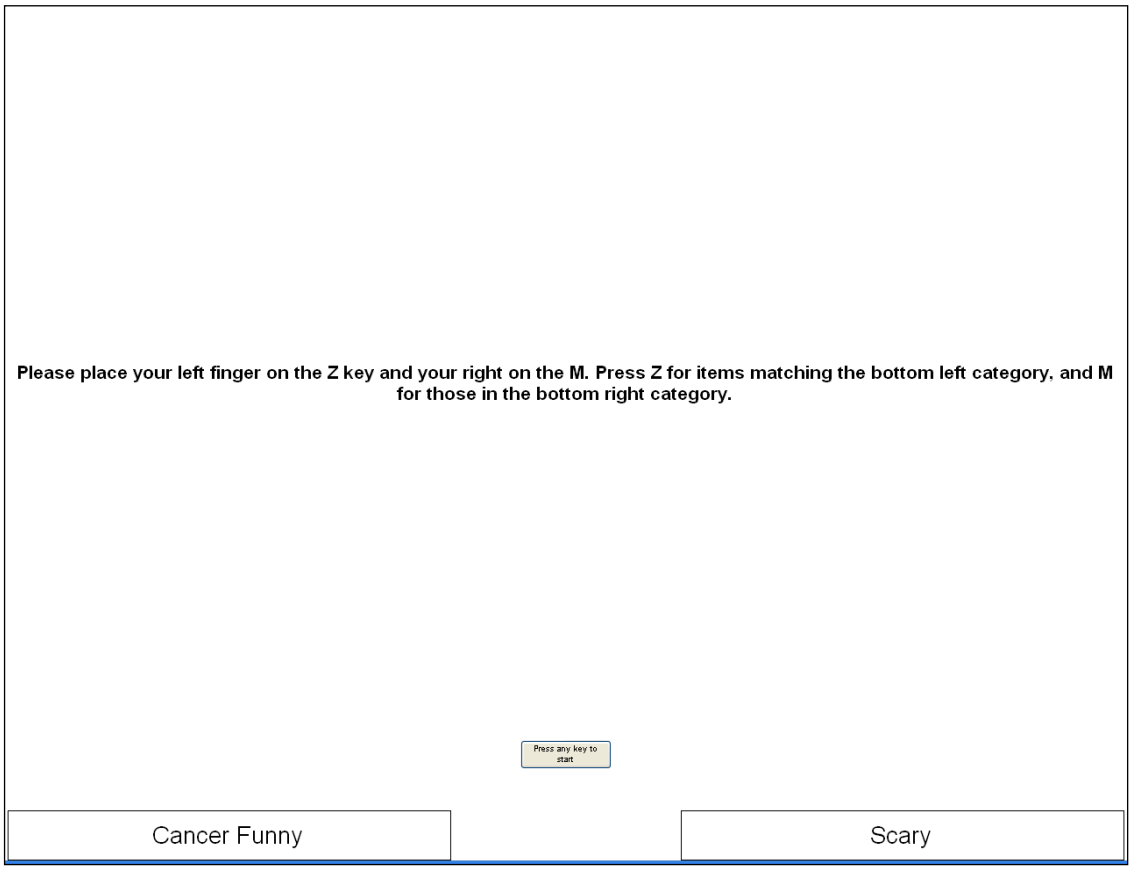
Yours sincerely

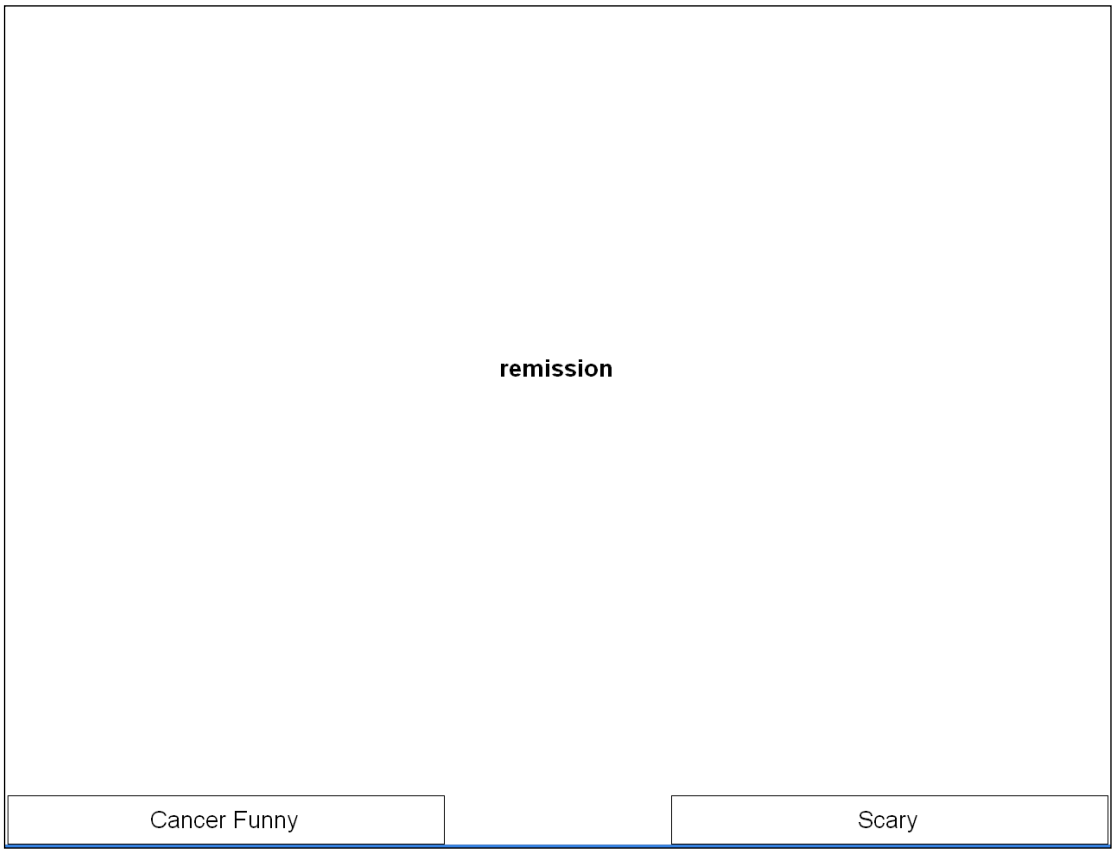
Sir John Birch
Chair of the UCL Research Ethics Committee

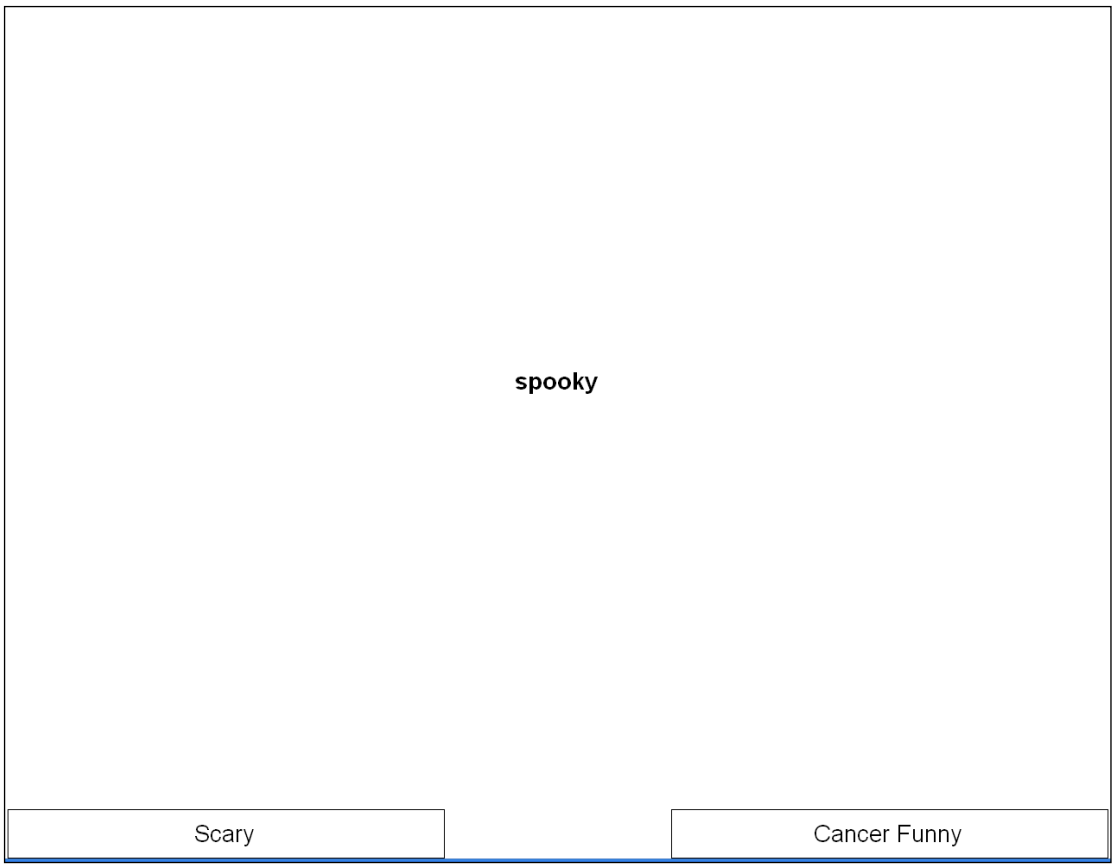
Cc: Gareth Lloyd

UCL Research Ethics Committee
Graduate School
UCL
North Cloisters, Wilkins Building
Gower Street London WC1E 6BT
Tel: 020 7679 7844
Fax: 020 7679 7043
Email: ethics@ucl.ac.uk

Appendix 18. Screenshots of SC-IAT.



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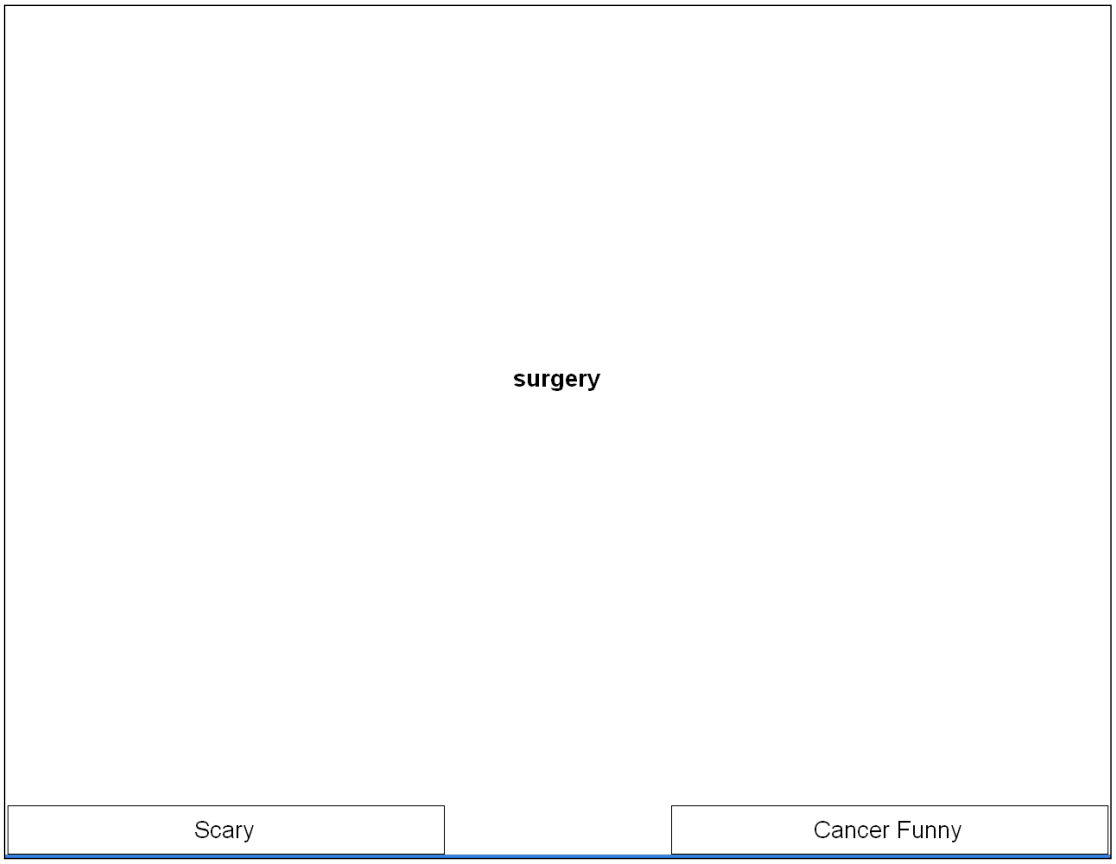
Scary
Cancer Funny


chilling
Cancer Funny
Scary


surgery
Scary
Cancer Funny

7B Coborn Road,
London
E3 2DA

30th October 2011

Lynn Myers
Brunel University
Uxbridge
UB8 3PH

Dear Prof Myers,

Re: Changes to my doctoral thesis

Thank you again for all the work that you have put into the examination of my thesis; following the viva which you and Patrick Walker conducted in late 2010, I am now sending it back to you with the changes that you recommended. Given the extensive nature of the changes recommended, I have not highlighted them in the text itself; given that entire chapters have been rewritten based on the reccomendations, I have instead provided a comprehensive list of the changes set out by Mr Walker's and your own examiner's reports. Where appropriate I have provided a response by setting out what has been changed, and where the change can be found in terms of the new page number. General recommendations have been followed throughout the rewriting process.

I have provided a hard copy, but can also provide an electronic copy if that would be useful.

I look forward to hearing from you and am grateful for your ongoing efforts,
Yours Sincerely,
Gareth Lloyd

General points.

i) Although the set of studies undertaken are of PhD standard, it appears that the candidate has not grasped what it means to write up a PhD thesis.
> To address this and the following points in this section, the entire thesis has been rewritten with these guidelines in mind. The emphasis during the rewrite has been on the following:
- Ensure that the logic of the thesis is sound (see below), with all chapters linking to the next and previous evidence or studies informing hypotheses.
- Ensure no unsubstantiated or emotive statements.
- More thorough referencing and literature reviews (with the latter achieved in many cases, particularly in the first two chapters, by splitting sections into further subsections and focussing the scope of the review).
- Providing critical review of referenced literature, with a view to differentiating between quality of evidence and synthesising findings. In addition has been useful to summarise reviewed literature where necessary, pulling out common and useful findings.

ii) Throughout the thesis, there is a lack of consistent and depth of reading of the literature. There are paragraphs, indeed pages, without any reference to outside literature, and it looks as if the candidate is using their own personal opinion throughout much of the thesis. From the Viva, it became clear that the candidate had undertaken much outside reading, but for some reason decided to write the thesis in an unconventional manner. It is important to note that the External Examiner's own very brief literature searches revealed that the candidate has ignored much of the literature.
> In accordance with this recommendation, a great deal of attention has been given to referencing of material during the rewrite. New literature searchs have been run for each area of review and integrated much more closely with the reasoning and logic of the thesis.

iii) The candidate needs to carefully check the whole thesis and remedy this. All literature reviews and discussions need to be linked to appropriate studies and papers.
>Literature reviews and discussions have all been rewritten with this guidance in mind.

iv) There is no evidence of critical reading of any papers. In the Viva, it was unclear whether the candidate had indeed critically read any papers. All studies are not equal and the candidate must make it clear his ability to critically read and comment on studies by including brief critical reviews of some studies throughout the thesis.
> A careful attempt has been made to demonstrate critical reading of papers thoughout, including relative assessment of quality criteria where appropriate.

v) None of the Chapters are linked to the next one and there appears to be no overall plan. It is unclear why the candidate has undertaken the literature reviews that he has. They do not make coherent literature reviews that correspond to the studies. Also, the candidate mixes up theory and methodology, and these need to be clearly separated.
> Logic and flow of thesis has been extensively revised, along, accordingly, with literature reviews. Chapter 2 now split into clear theory/methodological sections (as per guidelines set out in reccomendation 2b).

vi) Throughout the thesis, there is no cross referencing, no explanation of terms, except in two tables which are mainly unreferenced, and pages sometimes break at strange places. Sometimes referencing of instruments is omitted.
>Explanation of terms is now integrated with the text (aforementioned tables are removed); extensive cross-referencing added; page break/formatting issues corrected. Instruments now referenced at first use or in Chapter 3, with subsequent uses cross-referenced.

vii) Secondary referencing is not acceptable at this level.
> Instances of secondary referencing throughout the thesis have been removed.

viii) Appendices are not referenced.
> Care has been taken to ensure appendices are now referenced (inc. page reference) wherever appropriate.

ix) A PhD thesis must be objective. Need to take out emotive phrases throughout the thesis such as “crucial”, “timely exploration”
> This has been kept in mind during rewriting of all content.

x) The reference section has not been checked, as it is a mixture of styles.
>Reference section has been rewritten and checked.

Empirical Chapters

a) All hypotheses are incorrectly stated. Aims of the studies should be discussed, referring back to the literature. This should be followed by formal stating of the experimental hypotheses.
>In each empirical chapter, following introduction there are now presented two sections: aims and hypotheses, of which the latter are a formal statement of hypotheses.

b) Numbers need to be consistent to two decimal points. The candidate has numbers sometimes to 1 decimal point, sometimes to 2 decimal points and sometimes to 3 decimal points.
>This is addressed throughout.

c) In the measure sections you only the measures are mentioned not the literature which should be discussed in literature review.
> Hopefully this is what is meant, but measures used are now the only content in the measures sections, rather than any literature. In accordance with advice from supervisors each now includes a reference or cross-reference where appropriate, but the relevant literature has been reviewed beforehand.

d) Some studies have design sections some do not,
> All experimental chapter methods now follow: participants, materials, design, measures, procedure, methods of analysis (where necessary). (In later studies design and procedure sections are combined where procedures remain the same as the previous study.)

e) There is inconsistency when reporting analysis of variance results. The candidate must report F values and degrees of freedom not just p values.
>This has been addressed throughout.

f) Discussions need totally rewriting. The findings need to be discussed in relation to literature previously reviewed, and if necessary new material can be brought in.
>Discussions now focus on comparing obtained results to previously reviewed evidence when new findings to the series, and comparing with previous results when not. Given that later empirical chapters feature a great deal of refinement and replication of earlier findings from experimental series emphasis is very much on cross-referencing to earlier discussions in these cases. New discussions and evidence are only brought in when they do not replicate earlier content.

g) The results sections need to be much clearer. After rewriting the hypotheses earlier on in each chapter, the candidate should rewrite the results sections. There should be a section of descriptive statistics followed by inferential statistics. Each inferential statistics section could have the hypothesis as the title, and then the analysis, then the next hypotheses, and then the next analyses etc.
>This advice has been followed throughout (including use of hypotheses as titles of results sub-sections).

Chapter 1

1a) This chapter should be clearly divided into medical definitions/issues of cervical cancer/HPV, followed by informed consent/ethical issues/information provision etc. The candidate needs to check this chapter carefully as all through it there is a lack of evidence that he has read the appropriate literature.
>This chapter has been restructured as per guidance, and rewritten with the general guidelines in mind (emphasis on critical appraisal and more thorough review of literature), along with the recommendations that were given by examiners during the viva. Structure is now:
1.1 Aims and Purpose
1.2 HPV and cervical cancer
1.2.1 Epidemiological implications of HPV developments
1.3 Psychosocial and ethical issues relating to HPV
1.3.1 Informed consent and information provision.

1.3.2 Ethical and moral arguments.
1.3.3 Channels of information provision.
1.3.4 Awareness of HPV
1.3.5 Responses to HPV information
1.3.5.1 Responses in an HPV testing context.
1.3.5.2 HPV information provision in non-clinical settings.
1.3.5.3 Responses to HPV information: summary
1.3.7 Challenges specific to HPV information provision.
1.4 Summary.

1b) Page 20 line 8 'Both of the high risk strains' Need to mention that there are in 20 different high risk types of HPV which can cause CIN and cancer.
>This has been included and is covered in more detail (supported by evidence and references). See p15.

1c) On page 22 "there have been concerns from public health groups over how best to provide the public with knowledge about HPV." Need to enlarge upon it as the candidate has not provided any evidence.
>Restructuring of this chapter to general guidelines has meant removing this quote as these concerns could only be referenced generally through editorials. To support this argument this section now covers issues of informed consent more comprehensively, before moving on to consent in vaccination, before discussing editorial pieces about HPV. Informed consent is addressed in 1.3.1 (p22) and ethical and moral arguments in 1.3.2 (p27).

1d) The candidate then talks about the key arguments about basic knowledge and decision-making and possible negative emotional and behavioural consequences but no references on the information. Informed consent is an important part of this chapter and the thesis as a whole. This deserves a thorough literature review and not just one or two secondary references.
> This is covered by the above point.

1e) Similarly, it is not clear why there is discussion on persuasive communication and fear appeal. This needs to be made clear.

>Mentions of persuasive communications and fear appeals now limited to relevant section in Chapter 2.

1f) Definition of persuasive communication on page 23 is candidate's own personal definition, which is not appropriate.
>Moved to Chapter 2 as per 1f, and is now reference from original source: p84.

1g) On first paragraph of page 22 there is only one reference, and on the second paragraph there is only one secondary reference, yet there are lots of published studies in this area. The candidate also repeats himself in the first paragraph with no references.
>In line with 1c this paragraph, along with the entire section, has been thoroughly revised. A subsection is now dedicated to discussing informed consent and related evidence: section 1.3.1 (p22)

1h) On page 23 he mentions the GMC recommendations of importance on doctor-patient communication – what are they?
>Added information on relevant guidelines from GMC (although only those relevant to informed consent). See p22; and given that they build on Applebaum et al.'s (1987) principles only the unique additions are covered in detail.

1i) On page 24 the rest of the paragraph has no evidence that the candidate has looked at any literature.
> This paragraph has been changed extensively in the rewrite of this section; now incorporated into an extensive review of informed consent and decision making (section 1.3.1, p22).

1j) The candidate discusses a paper by Marteau and co-workers (2001) about health related decision-making. What is the system and how did they come about the classification.
> Marteau and co-workers' work on health related decision making now discussed more thoroughly in the following chapter as their work relevant to multiple points of the literature reviewed here as well as determining the multi-measure approach used in the experimental series. See Chapter 2, p48.

1k) On page 25, the first paragraph has no evidence of literature review.
>This section (previously 1.5 HPV information provision, p25) is now integrated with 1.3.7 Challenges in HPV information provision (p43), and deals with a limited number of points, each attached to one or more pieces of evidence, though refers back heavily (via cross-referencing) to the reviews of informed consent, informed decision-making and responses to HPV information earlier in the chapter.

1l) On page 26 last paragraph first sentence – this is a strong assertion with no references.
> Reference added (content analysis of media messages); assertion in this paragraph has also been toned down; see p45.

1m) Candidate says evidence is mixed with respect to whether risk compensation is evident in relation to health issues, yet he only mentions one study.
No references on last sentence of this paragraph and next paragraph.
> More comprehensive review of relevant risk compensation studies now included in section 1.3.2 demonstrating mixed evidence; see p27.

1n) Bottom of page 28 section 1.7: no references.
> Section extensively revised but equivalent content is now in section 1.3.3 (p29). Entire section now refers extensively to previous evidence.

1o) Last paragraph on page 29 where is the evidence for the first sentence? Davies et al study is eight years old and that is a long time in Internet terms. Need to investigate what has been undertaken since?
> In accordance with previous point, a more recent study added (Habel, Liddon and Stryker, 2009), and the strength of the first sentence tempered in line with this newer evidence (see p30).

1p) On page 30 Waller et al, is unpublished data. As unpublished, it needs to be explained in detail.
> Unpublished data reference removed as did not add to the discussion now that extra added literature is referenced.

1q) On Page 32 there are no references. On page 32 age groups are suddenly mentioned: this needs to be enlarged and referenced. The candidate then says "it could be argued that…." Where is the candidate's evidence? The candidate talks about earlier discussion – no references or cross-referencing.
> Parts of this section have been cut and others integrated with the chapter summary, as it no longer fit before the section on responses to HPV information. A full discussion of age-specific and adolescent responses is now provided in two sections of this chapter; see p32 and p32.

1r) The candidate suddenly mentions about informing women about a novel and real health condition which is potentially complex and threatening, but this is the first time we have heard this. Need to explain why this is mentioned and relate it to the literature.
>Statement removed according to general guidelines as seemed an overly emotive phrase. However evidence reviewed in this chapter covers the novelty (p37), complexity (p43,) and threat perceived (p36, p37) in HPV information, and so a toned down version of this point is included in the chapter summary (p45).

*1s)*The candidate has "basic" research questions that do not flow from the literature reviewed. The links have to be made specific.
>Summary section (along with entire chapter) thoroughly revised to make explicit the links between presented evidence and research goals; p45.

<u>Chapter 2/Chapter 3</u>
2a) A chapter cannot be two pages. Therefore, Chapter 3 needs to be integrated with Chapter 2.
>This has been done. Remainder of chapter references in this document have been amended accordingly.

2b) The literature reviews in Chapter 2 incomplete and they do not link with the empirical chapters. Therefore, the literature reviews need to be totally rewritten, to correspond with the empirical studies.
For each review there should be theory followed by methodology. Methodology should be considered after theories i.e. the difference between implicit and explicit measures.

Each theory and method must include a comprehensive critical discussion of all relevant studies.

So, the literatures are:

- Perceived needs of health promotion research (study 1)
- Dual-process theory (study 2)
- EPPM (study 3 and 4).

>Chapter restructured as requested, with following subsections:

- Challenges for theory and methods. (After extensive discussions with supervisors, this section appeared to repeat a lot of content from the previous chapter, and seemed somewhat out of place. Instead this has been repurposed to set out the needs for the theory introduced in this chapter, and outline a general framework. Any extra literature – e.g. HPV awareness in adolescents – has been moved into new sections in Chapter 1.)
- Dual-processing
    - Theory
    - Methodology (IAT, studies exploring differences between implicit and explicit measures)
- EPPM
    - Theory
    - Methodology (Risk Behaviour Diagnosis Scale)

2c) On page 38, the table of definitions which may or may not be linked to parts of the thesis needs to be taken out and definitions should be in the text throughout the thesis in relevant places.

>Table has been removed, and definitions revised into text where needed. Care has been taken to stick to standard terms throughout.

2d) Information that is not relevant news to be taken out e.g. health psychology theory/models.

>The entire section at the start of Chapter 2 on other theory/models has been removed (very limited amount of relevant content with 'perceived needs of health promotion research' as per previous point)

Chapter 4 (now 3)

3a) It is not clear why the candidate had undertaken this particular critical review. The candidate needs to look at general points when revising this chapter. For example, first two paragraphs do not have any evidence that they are from published sources.
>Introduction to section (3.1, p81) has been thoroughly revised; now follows on from needs outlined in Chapter 2 and contains appropriate references.

3b) 4.2.1-for what years was the search undertaken
>Info on this added, p83.

3c) Inclusion and exclusion criteria need to be stated before you undertake a review is undertaken. They cannot be used to make your review more manageable. Therefore this needs to be undertaken more thoroughly.
>This has been addressed; original intention of this statement was that primary search terms of 'print' and 'cancer' were very general, with secondary search terms designed to make the search more specific to health promotion research (rather than an ad hoc modification to the search method). All 1004 studies were in fact examined according to a priori criteria. This is now reflected in text, p84.

3d) It is not clear how the empirical studies were informed by the review.
> Implications section (3.4.2 and subsections; from p103) has been extensively expanded and revised, and is now cross-referenced by later uses of the measures identified. The purpose of this section is now to introduce those measures which are initially used by the empirical studies.

Chapter 5 (now 4)

4a) Literature should have been fully reviewed in Chapter 2 and just summarised in this chapter.
>Section is rewritten; cross-references relevant literature in Chapter 2 (under perceived needs of health promotion research section) and Chapter 3 (where the relevant measures are identified). See section 4.1 and subsections, from p108.

4b) It is totally unclear whether hypotheses originate from.

>Section now separated out into background, aims, and hypotheses. Hoped that this demonstrates how background and previous evidence informs the aims of the study, and, in turn, the hypotheses of the study. See section 4.1 and subsections, from p108.

4c) As already mentioned, hypotheses need to be formally written.
> This has been done in line with other chapters and general guidelines (separate from aims).See p113.

4d) On page 117 what does active consent mean?
> Clarified to reflect an opt-in consent procedure (see p114).

4e) On page 118, more information is needed on the design of the information leaflet.
> More information now provided on the design of the leaflet. See p114.

*4f) T*he interviews were they with adults or were teenagers involved?
> This info added to section 5.2.2 (p114; all were with adults).

4f) 5.2.4.1 any reliability data on the scale?
> This data has been added to this section (p118).

4g) On page 121 "these items were novel and based on the concept that participants spontaneously generated. qualitative work carried out by Waller and colleagues" is this published?
> Cross-reference added pointing to the relevant literature reviewed in Chapter 3, singling out one specific published study. See p116,

4h) 5.2.4.5 "maintained a shorter likert scale to maintain parity with this work"
What does that mean?
> Statement was intended to explain why different lengths of likert scale are used across measures. This is explained by the (now added) cross-reference to the original use of the items however (p116), so this statement has been removed.

4i) "these variables were not recoded because they are not measurements of a single dimension" What does that mean?

> Apologies for lack of clarity in original statement; was intended to state that these items are very diverse and unlikely to form a coherent scale (ie. all reflected by a higher-order variable of 'vaccination attitudes). Description in text has been modified to explain this better (p116).

4j) On page 124 you can't say that "HPV test was not quite significant"
either it is a significant or it is not. Similarly on page 128.
> This has been rectified in both cases: respectively see p120 and p124.

4k) On Page 127.need to explain why you used "bootstrapping analyses" what it is, why you used it. Similarly on page 128 for beta path.
> Statistical analyses section now contains greater detail on methods of reporting outcomes of mediation analysis, including explanations of beta path and bootstrapping (and why Sobel test now not reported).See p118.

4l) On page 128 you mentioned confidence intervals, but you have mentioned anywhere else. Why?
> This was in compliance with the reporting conventions of mediation analyses set out by Preacher and Hayes. Bootstrapping analyses report confidence intervals rather than P values: this is now covered in a section that has been added to the statistical analyses section (see p118).

4m) On page 128 why use the sobel test? The Sobel test works well *only in large samples*. Therefore, need explaining why this is used.
> Sobel test was originally included for completeness sake only; now removed from analysis (section 4.3.7, p123). The rationale behind this is now covered in the statistical methods section(see p118).

<u>Chapter 6 (now 5)</u>

5a) Introduction – the same problem, the first page and a half have no references. Levels of processing, Should have been comprehensively reviewed in Chapter 2. Similarly, all the implicit memory test measures: advantages and disadvantages should

> This section rewritten to include extensive cross-referencing to Chapter 2; limited amount of new evidence introduced only (p132).

5b) Again, unclear were hypotheses come from and written in a nonstandard way
> As in other chapters, aims (p135) and hypotheses (p135) separated and the latter rewritten to conventional standards.

5c) Materials on page 145 6.2.2, materials, – what does that mean? Cancer research UK leaflet not referenced. What does "broadly describe the issues and ways of preventing it" mean?
> More info, including reference, now included on CRUK leaflet; p137. More straightforward description of the leaflet's content included (quoted statement removed).

5d) Why was the PANAS used in this study but not in the first study described in Chapter 5?
> Added explanation in introduction with reference and cross-reference (p132; different experimental setting allowed inclusion of more measures; useful because measures both positive and negative affect). Also relevant info added in Chapter 3's discussion, as this is where most of the series' measures are fully laid out (p103t; this is also cross-referenced on p132).

*5e)*No referencing for knowledge questionnaire.
>Previous use now cross-referenced: p138.

*5f)*On page 152: 6.2.6 what post hoc test measures were used?
> Information has now been included in this section: p141.

5g) On page 161 you say you use an analysis of covariance is not what you said you said you were going to do. What Post hoc test s did you use?
> Information on this alternate method of analysis should have been included in 5.2.6 (see previous point); this has now been added (p141). References to post-hoc tests were out-of date and should not have been there; all are planned comparisons.

5h) On page 162 6.3.3 what is "the simple single factor analysis."
> Referred to single-factor ANOVA: changed in text (p142).

Chapter 7 (now 6)

6a) Why have used the short STAI in Chapter 5 in Chapter 6 but used to full STAI in Chapter 7.
> Paragraph added in introduction to explain this: p158.

Chapter 8 (now 7)

7a) Aims and hypotheses are very muddled.
> Aims and hypotheses separated as per other chapters

7b) 8.3.4.1 – why factor analysis?
> Explanation included in statistical analyses section (p194). Current instrument contains a large number of diverse items; useful to know if can be reduced into meaningful higher-order types.

Chapter 9 (now 8)

8a) On page 259 first paragraph – how may this benefit health psychologists? What is your evidence?
> (Assuming this was in reference to p257) This sentence removed (whole section revised); similar ground is covered by the examiner's later point (*8d* in this chapter) on the relative utility and drawbacks of implicit measures.

8b) On page 258 "as was covered in the review of theory" what review? Where?
>This sentence also removed during revision of the section.

8c) Again, no reference to literature.
> Assuming this point refers to the comparison of category labels in the IAT, two relevant studies have been identified and referenced and these used to frame the

research question, though it is also noted that no previous studies have asked this specific research question (see p218). Care has also been taken to ensure more thorough referencing throughout this chapter.

8d) In the last sentence "it is hoped that the analysis presented demonstrate there are a number of interesting avenues of investigation relating to the implicit measures in health psychology" what does that mean?
> See p231; this paragraph has been revised to put forward a much more specific point about the utility of implicit measures in health research in light of some outstanding methodological and theoretical questions about their use.

Chapter 10 (now 9)

9a) The final chapter suffers from the same problem as the rest of the PhD thesis in that there is a lack of evidence of outside reading, and the results are not integrated into the framework of previous research. Should be an integration of all the studies. Strengths and limitations of the research programme should be discussed and future research should be identified based on studies of the thesis. As discussed in the viva, the candidate me if he wishes to introduce a theoretical model based on the findings and suggest how this could be researched in future studies.
>Chapter thoroughly restructured and revised according to general guidelines. Now split into the following sections:
9.1 Aims (short restatement of thesis aims)
9.2 Summary of findings and contribution to literature (revisit major findings and relate to previous literature)
9.3. Limitations (general evaluation and limitations, split by major issues)
9.4 Summary of implications (general implications which are study wide; more discursive than 9.2)
9.5 Future research
9.6 Concluding remarks (brief conclusion)

Furthermore effort has been made to ensure that literature has been referenced appropriately, in line with the general guidelines. This seemed especially important in Section 9.2 (Summary of findings and contribution to literature; from p233). On

consideration however I did not wish to present a theoretical model; as discussed in Chapter 9, before a general account of responses can be proposed, a study or studies are needed that examine the range of responses used here, though with a set of information materials that causes an affective response.

Further changes were recommended by PW; please see below for a list of these as drawn from PW's report along with the changes made to the text in response.

i) Address spelling and print errors
This has been done; please see below for a list as compiled from LM and PW's reports.

ii) Add index to appendices
This has been done.

iii) Address issues relating to minutiae of HPV issues as discussed in viva.
These issues have been addressed throughout chapter 1.

iv) Expand issues of informed consent and persuasive communication
A dedicated section to informed consent and decision-making has been added in chapter 1, and as discussed in viva, the discussions of persuasive communications moved to the fuller discussion of this issue in chapter 2.

v) Improve explanation of IAT
The introduction to the IAT (see from p49 onwards) has been expanded and the methodology moved to chapter 2.

vi) Address evaluation and reasoning behind use of Chlamydia as a control condition.
According to these and LM's comments, the reasoning behind the use of this control condition has been made more explicit, and relevant evaluative material and references introduced in the discussion of chapter 4 (see p129).

vii) Address and evaluate the use of scary and funny as categories in the IAT.

More material is now used in justifying the original use of these categories, but it is made more explicit that this choice did not appear to impact responding (as examined by the final study).

viii) Highlight the possible future research potential of examining delayed anxiety levels.
ix) Highlight potential media coverage affecting perceptions of environmental climate issues.
This has been added in the general discussion (see section 9.3.2) and also highlighted as a potential avenue for future research.

English and spelling

*10a)*Page 36 second para ?word was
> Entire para revised, but equivalent text is now on p46.

*10b)*Page 40 penultimate 'that that'
> Section removed according to general guidelines.

*10c)*Page 43 penultimate line given not 'give'
> Para removed according to general guidelines.

*10d)*Page 78 2.7.2.1. lines 4 and 5 use of word predict ? missing 'to'
>Sentence revised and expanded according to general guidelines. See p53.

*10e)*Page 86/87 ?print error of legend and table
> Error recified: p83.

*10f)*Page 88 line 10 'those' studies
> Error rectified: p84

*10g)*Page 101 starts a sentence with number 13
> Error rectified: p96

*10h)*Page 104 missing word line 6
> Error rectified: p98

*10i)*Page 131 start line 6 missing n from show)
>Error rectified: p128

*10j)*Page 142 – don't use 'I' , occur should be occurring and scary is mis spelt
> Errors rectified during rewrite of section in accordance with general guidelines; equivalent text now on p135.

*10k)*Page 154 and 155 legend and table separated
>Formatting error rectified.

*10l)*Page 156 Figure 6 is on next page and no reference as to where to find it – page 162
>Formatting errors rectified and page cross references inserted, p112.

*10m)*Page 160 print error
> Formatting error rectified.

*10n)*Page 170 line 2 - seemed 'to' show
> Para extensively revised according to general guidelines

*10o)*Page 175 spelling line 1 chose'n'
>Error rectified, p155.

*10p)*Page 222 apx 8 is on page 378
> Crossreferencing or all appendices has now been implemented throughout, including page numbers.

*10q)*Page 226 appx 12 is on page 403
>Crossreferencing or all appendices has now been implemented throughout, including page numbers.
*10r)*Page 259 last line 'to' shouldn't be there

> Para extensively revised according to general guidelines

*10s)*Page 275 missing ‘ be in line 9’

>Error rectified, p231.